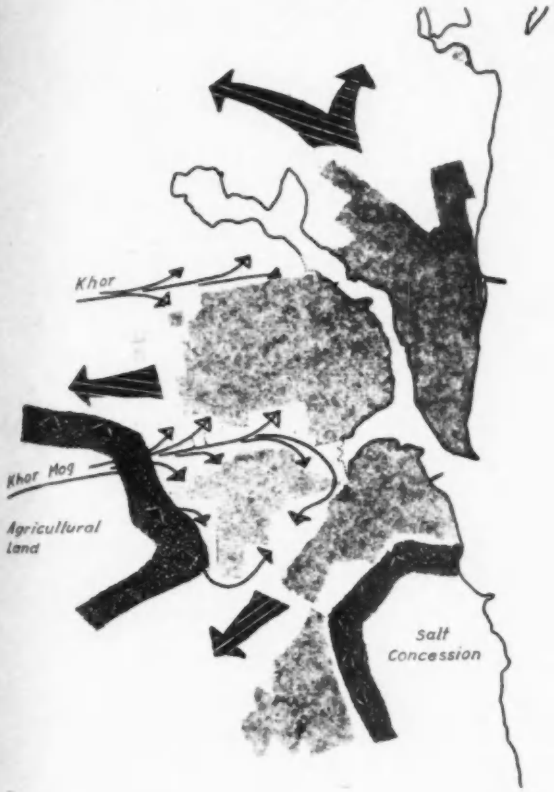
Serial Dept.
19

EKISTICS

ABSTRACTS ON THE PROBLEMS AND SCIENCE OF HUMAN SETTLEMENTS

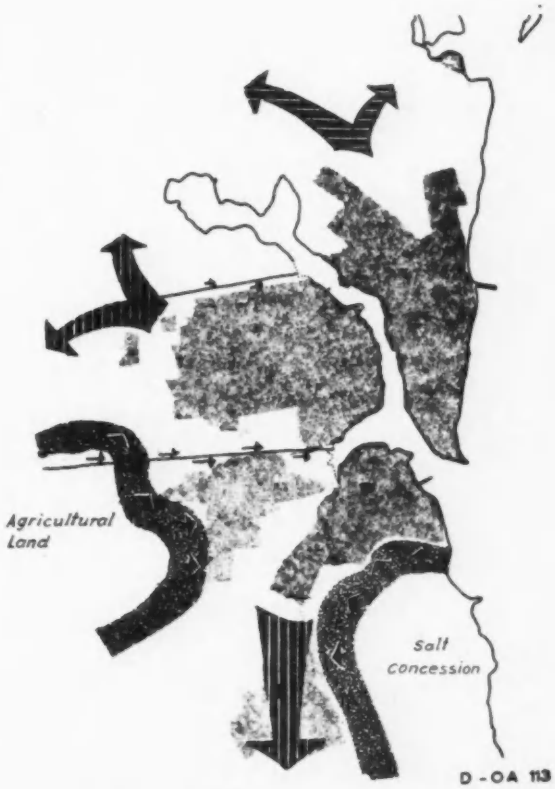
ΟΙΚΙΣΤΙΚΗ

FEBRUARY · 1960



Land available for development

Control of floods
Land suitable for development



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ABSTRACTS

of

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All enquiries regarding the contents of EKISTICS to:
J. Tyrwhitt, 7 Sumner Road, Cambridge 38, Massachusetts, U.S.A.

All enquiries regarding the distribution of EKISTICS to:
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EDITORIAL

In the January EKISTICS Dr. C. A. Doxiadis suggested three major problems affecting the city of the future in his article Dynapolis. That month the problems resulting from increasing technology and an increasing interest in social development were featured. This month the growth of population is the theme.

HOUSING AND COMMUNITY DEVELOPMENT FOR EXPANDING POPULATIONS

Caracas, Venezuela, has tried to solve the problem of housing growing city populations by a rush program of high-rise apartments. The maintenance of these proved so unsuccessful that a reappraisal by an international team of experts was deemed necessary. Eric Carlson reports the findings and suggestions made by this team in trying to socially and economically find ways of bridging the gulf between living in a rural shack and living in one of 95 high-rise slabs.

Community development itself or, in its simpler form, housing management, was one of the things lacking in the huge Caracas housing project. The evaluating team considered this of the first importance, as enabling people to find some identity and some social responsibility in relation to their dwelling place in the city as well as in the country. Ibrahim Shamim further emphasizes this, stressing the need for leadership to arise, and be encouraged, from members of the community itself, to supplement and later supplant leadership from trained technicans.

The provision of housing itself, its form and its economics, are closely related to the development of the community. The quantity of housing needed for the future can be met by many different forms according to the various local needs. The Worker's row housing in Milan is both an interesting and organized design relating site and unit together. R. Nilsson analyzes the provision of heating for row houses in a northern climate and shows that joint heating becomes much more economical, even for low density development, than single units in each dwelling.

ANALYSIS OF POPULATION PROBLEMS

There have been many conferences throughout the world in the last few years focussing on the ways and means of analyzing the problems resulting from growing populations. This month abstracts are presented from papers given to two of these; both in Latin America.

The first paper, from the Caribbean Conference, relates the social problems of migration to much wider problems and points to significant areas for further research.

The United Nations Seminar or Evaluation and Utilization of Population Census Data brought forth a massive collection of papers all on very specialized subjects and three with special interest to the science of ekistics have been abstracted. Donald Bogue presents a workable method of analyzing internal migration which was prepared for India but is practicable anywhere in the world. This method employs minimum data to obtain maximum analytical results and seems as though it should be very useful for estimating trends in urbanization. C. Chandrasekaran analyzes methods of sampling to extend existing data. This problem is very important as few of the merging countries possess complete census data as a basis for future planning.

Means of measuring the level of living, which is a most important yardstick in estimating planning, housing needs and standards, are presented by Bernard Benjamin. This is a very thorough paper, presenting examples of the various measures with both their strong points and their pitfalls.

POPULATION AND TECHNOLOGICAL PROGRESS

The ekistics of human settlements brings together and balances the standards of living and technological progress. Thus, both must be understood in relation to each other. G. Neil Jenkins, surveying the problem from the point of view of world interaction of population, and standards of living progress, is particularly interested in the technical progress of agricultural production to support growing populations. The report, "Sheep Getting New Lease on Life" provides an example of one of his line of suggestions: in this case, the outcome of an interchange of knowledge of sheep husbandry from Australia to Libya, resulting in better production in Libya.

PORT SUDAN: PLANNING FOR POPULATION GROWTH

In this recent project prepared by Doxiadis Associates, examples occur of many subjects raised by other articles in this issue. The problem of housing management and and its importance is touched upon, for here--as in so many other cases--it may prove economically essential to house rural immigrants in blocks of flats.

Many of the criteria discussed by Bernard Benjamin for measuring standards of living are here available--though not in a comparative form. The report, as usual, traces the plan through three stages: an assessment of the problems, statements of principle or policy and the resulting master plan and the program for its first stage.

Carlson, Eric
HIGH-RISE MANAGEMENT, DESIGN PROBLEMS AS FOUND IN CARACAS
Journal of Housing, October, 1959, Pages 311-314. Illustrations.
333.073.515 (87)

1. Eric Carlson, an American serving as technical adviser in the central coordination and planning office of the Republic of Venezuela has summarized a report of a study by an international team of experts. This group included administrators, managers, social workers, anthropologists, architects and planners. The study focused on the virtually catastrophic management and maintenance problems found in the 97 dramatic 15 story apartment buildings that have made worldwide architectural headlines for Venezuela since the first went up on 1954.

2. Suppose you were the new administrator of a famous housing agency and found:

a. Unpaid rents, amounting to 5 million dollars,
b. Monthly losses of $500,000 in direct maintenance and personnel costs,
c. Four thousand families living in apartments that they have illegally invaded,
d. Shack towns of ranchos springing up on every one of your project sites, with no police protection available,
e. Schools for only half of the estimated 40,000 school age population (5-14) living in the housing projects under your jurisdiction,
f. Community facilities taken over and used as barracks by hundreds of families.
g. Juvenile delinquency and crime rates sharply increasing,
h. Tenant associations in the hands of political agitators,
i. Serious maintenance difficulties, created partly by lack of social adaptation of heterogeneous population,
j. Prevalent overcrowding, illegal subletting and double occupancy,
k. Administrative incompetence and disorganization at all levels,
l. A potentially explosive political atmosphere impeding drastic measures.

3. The above are some of the conditions that existed in Caracas, Venezuela, towards the end of 1958 in the superbloques, constructed by the Banco Obrero, the autonomous government housing agency, during the Péréz Jiménez dictatorship between 1954 and 1958. The superblock projects cost roughly 200 million dollars and officially house an estimated 180,000 persons . . . but the accompanying social, economic, and administrative difficulties were found to be so serious last year that, in effect, a civil anarchy prevailed, seemingly hopeless to resolve through ordinary means.

4. Study Launched. In its search for establishing order out of existing chaos, the Banco Obrero requested the Pan American Union's Inter-American Housing and Planning

Center (CINVA) in Bogotá, Colombia, to direct an evaluation that would cover the social, economic, technical, and administrative aspects of the superblocks and have the following objectives:

a. to establish criteria for future policy with regard to the construction of superblocks;

b. to recommend to the Banco Obrero immediate steps for improving living conditions in the superblocks and for the conservation of the investments that have been made in this type of construction;

c. to recommend to the Banco Obrero, and other authorities concerned, long-term steps for the management of the superblocks and the integration of their inhabitants with the community by means of educational and social programs.

5. The final report, published in Spanish, consists of six basic chapters:

I. General Considerations--The Housing Policy of Venezuela and the Superblocks.
II. Characteristics of the Superblocks and Their Population.
III. Technical and Design Aspects.
IV. Community Services and Social Aspects.
V. Administrative Aspects.
VI. Recommendations and General Considerations.

There are also 17 annexes, containing the results of various surveys, case studies, financial information, proposals for reorganization, methodology, bibliography, etc.

6. Major Conclusions. In the first place, the evaluation came to the conclusion that the government should suspend all construction of superblocks until there exists a defined housing policy related to the economic and social development of the country and within a process of national planning and coordination. It was found that the massive construction programs in Caracas had served to attract heavy migration to the city from rural areas and had, therefore, severely intensified the housing problem in the capital.

7. The management problems and social considerations also indicated the desirability of other types of housing programs, taking into account the findings of the report. The Banco Obrero and the Venezuelan government are now applying a policy of stimulating rural and regional development and promoting housing construction in the smaller cities and communities of the country, as a basic element in helping to stabilize the population and increase agricultural production. Several new towns with industrial bases are planned for the Caracas region, to aid in diminishing the pressure on the central core. Land and utility programs and aided self-help and mutual-help projects are also being given strong encouragement.

When study began, "ranchos" or shacks were proliferating on all project sites

8. Emergency Recommendations. The evaluation included a series of basic recommendations for an over-all national housing program for Venezuela, the majority of which are receiving special attention and action. But, emergency action was called for to confront head-on the most serious problems listed at the beginning of this article, with priority given to the immediate administrative procedures necessary. The most important were:

(a) An education and public relations campaign to explain the new policies and procedures of the Banco Obrero.

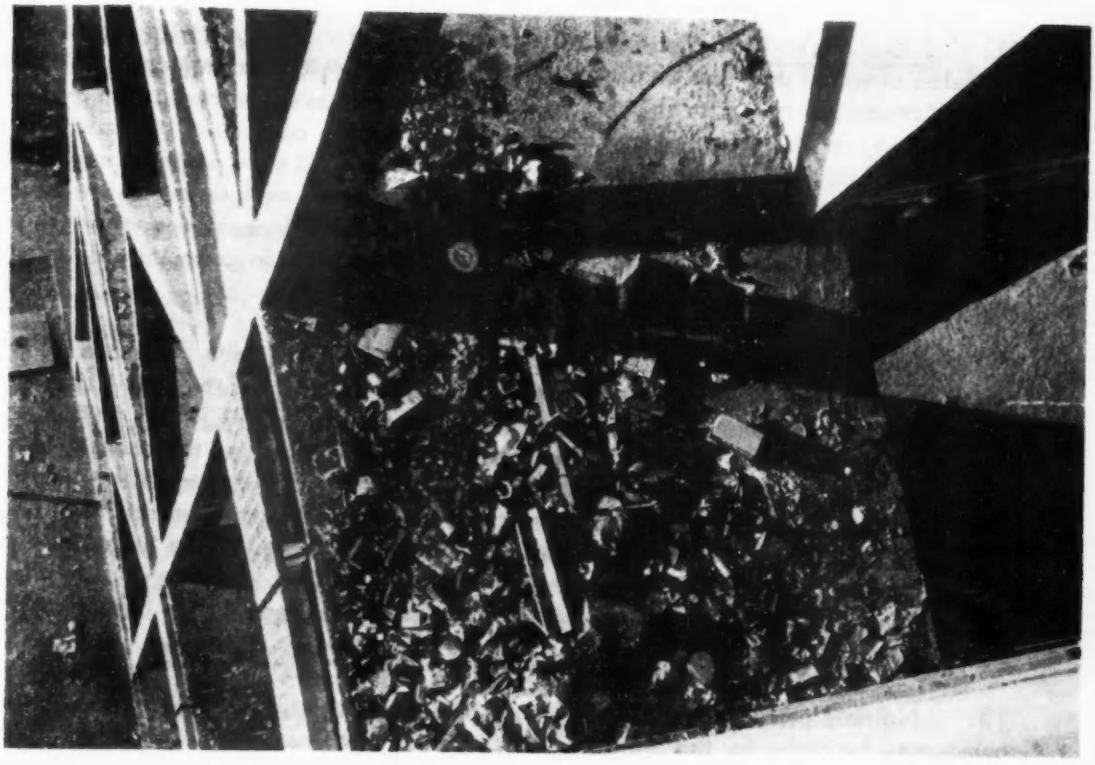
(b) Reappraisal of the costs of the superblocks and apartment units to determine their real value, and to determine the new rent and management policies. Families who have shown responsibility and regularity in rent payments to be offered the option to buy their apartments under favorable terms that they can afford.

(c) Decentralizing all functions of rent collection and payment to the projects.

(d) Establishment of a special provisional office responsible directly to the director of the Banco Obrero, to devote itself exclusively to the problems caused by the invasion of the apartments, to establish occupancy standards, and to translate policies into effective administrative measures, which, once in effect, are to be carried out by the regular departments of the Banco Obrero.

9. Design Difficulties. Architectural and technical deficiencies were found to be less important than the administration and the management considerations. The lack of careful programming was one of the principal causes of the deficiencies noted, as well as the lack of clear principles and standards necessary for the provision of community facilities and services in terms of quality and quantity. The decision to embark on a massive "crash" program of building superblocks was made with little previous economic or social study or planning. There was no progressive improvement in the design of subsequent construction and evidently little was learned from experience, as the first buildings constructed are as good or better than the newer ones.

10. In the Caracas climate, well-placed balconies are essential to satisfy the needs of people previously met by the interior patio or corridor in rural housing but, in the majority of the buildings, the balconies were eliminated. It was recommended that further studies be made of the actual use of kitchens, wash areas, and bathrooms to determine the improvements needed, with special attention to the provision of adequate counter and storage facilities, improvement of closet design, etc. For all public areas, the use of more resistant durable materials was urged. To overcome the impression of monotony and lack of human scale, recommendations were made for landscaping outside areas.



Evidence of damage resulting from (top) structural and (bottom) human errors

11. Social Facilities. Far more serious deficiencies were found with regard to the provision of social programs and facilities in connection with the projects. As a general policy, it was recommended that the Banco Obrero make every effort to turn over responsibility for the provision and maintenance of certain community services to the agencies and institutions normally responsible for them. All such programs and services should be open to the population at large and not restricted exclusively to the inhabitants of the superblocks. The creation of democratically elected tenant associations as a means of instilling moral and material responsibility and civic pride in community development was also urged.

12. Results to Date. In the few months that have elapsed since the publication of the evaluation report, steps have been taken to carry out most of the specific recommendations, and a new spirit is prevalent, far from the hopeless scene which existed at the beginning of the year. Rent collections are sharply up and, given the choice, the overwhelming majority of the tenants of the projects are showing that they wish to acquire ownership of their apartments. Basic terms are 10 per cent down payment, with balances to be paid off at 4 per cent interest over either 25 or 30 years. If the tenant does not have sufficient cash for his equity payment, he can enter into an option-to-purchase plan and acquire his equity over a five-year period by making slightly higher monthly payments.

13. Notable progress is also being made in the construction of new schools and other community facilities for the projects, the provision of new markets, the organization of consumer cooperatives, and in-service training for Banco Obrero employees. There is no doubt but that this is one evaluation that has "paid off" directly and immediately, and that the comprehensive approach of including social, economic, technical, and administrative factors in the study was indispensable to its success.

Shamim, Ibrahim

THE ROLE OF LAY LEADERS IN COMMUNITY DEVELOPMENT WORK

"International Review of Community Development" No. 3, 1959, pages 81-87.

711.437 (100)

1. Ibrahim Shamim of the West Pakistan Academy for Village Development reviews and outlines the position of lay leaders. Lay leaders are important to planners of all kinds--physical, social, and economic--in the backing and furthering of the plan by the local community.

2. What is a Lay Leader? In the course of working with people, the worker comes across villagers who appear to be relatively more stimulated and enthusiastic than others. They go about doing their assigned duties with vigour and devotion. They voluntarily offer to do more and are usually prepared to make sacrifice of their energy, time, and money. The readiness with which they come to the help of others and the contributions they make to the lives of other members of the community, are admitted by all. They are the foremost cooperators of the trained worker. It is with their help and sharing of the responsibility that the worker forges ahead with his plan. It is to these untrained and voluntary persons that the term lay leader is applied. They are not necessarily the traditional leaders like the headman of the Village. They derive their prestige from the community itself by virtue of the qualities of their leadership.

3. The Need for a Lay Leader. A Village Aid Worker will not make the community dependent upon himself by assuming all responsibility. If he has to share responsibility of planning with the people, mobilization of resources and execution of the jobs in hand, he has to discover such voluntary persons who command the genuine respect of the rest of the community, possess qualities of leadership and are prepared to share responsibilities of developmental undertakings with the worker. It is by involving such people that he can hope to develop his program. A significant fact that cannot be over-looked in this process is that the worker, after all, is an outsider. It takes a long time before his bonafide is established. People begin to repose increasing trust in him when they find that their own trusted brethren of the community are playing an active role along with him. Thus the need for discovering local leaders is patent.

4. The Characteristics of a Lay Leader. People who have engaged in Community Development work, by and large, agree that human and emotional qualities count most --not intellectual and professional attainments. Here are some of the qualities that have helped persons to play the role of lay leaders successfully.

(a) Prestige and respect of the community.
(b) Initiative, drive, and resourcefulness.
(c) Understanding and sympathy.
(d) Proficiency in a skill, especially one important in the community.

(e) Participation in group activities.
(f) Education.

5. The Selection and Training of Lay Leaders. In the light of the foregoing discussion the selection of lay leaders should move with judicious care and proper scrutiny. Initial enthusiasm may diminish with passage of time. Abiding interest and continued cooperation are excellent criteria to judge the suitability of a future leader. The training of these selected leaders is the most important link in the whole chain of community development work.

6. Lay leaders will have to be involved in an active manner at the planning stage. When a project is underway, specific responsibility should be assigned to the prospective leader. The trained worker should carefully watch how the leader goes about discharging his duty. He should give him help whenever necessary. If need be the lay leader should be allowed to make on-the-spot decision and action. The worker should aim at building up self-reliance in the local leader so that he will be able to carry on without the worker. Sharing of responsibility constitutes in itself a great motivation to work. The worker should let the initiative gradually pass from himself to the lay leader.

7. The worker should assist the lay leader in the review of his work: whether everybody discharged his assigned duties properly; whether all the resources were mobilized and put to proper use; and whether the budget was adhered to or not. In the end he will also help the leader to note the reactions of the people and reevaluate the task in view of possible corrections.

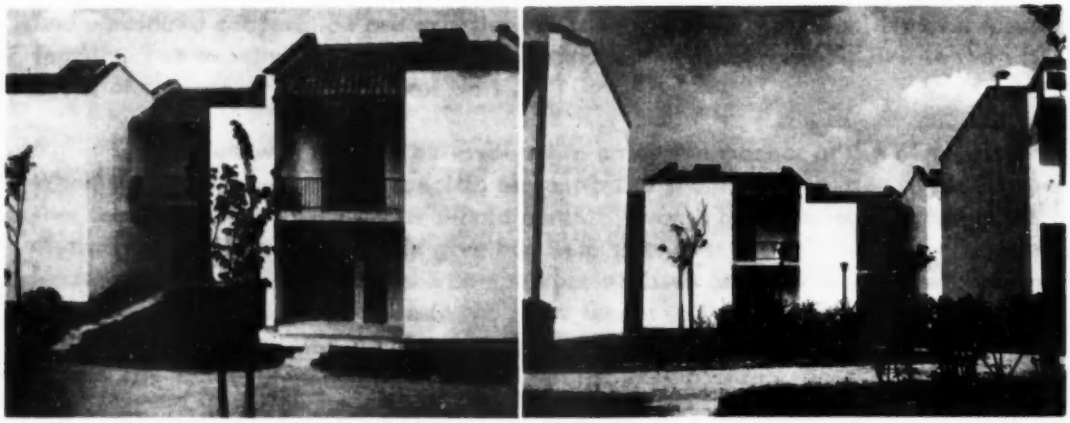
8. Apart from this formal apprenticeship it would be of considerable advantage if an informal program of orientation of the lay leaders were also provided. It might include:

(a) Visits to the Village Aid Training Institutes.
(b) Seminars and group discussion.
(c) Visits to other communities.

9. How will the lay leaders operate? Having passed the stage of apprenticeship and having received an informal training, they should now be able to guide the community confidently and effectively. They should be able to survey the needs of the community, analyze them, determine priorities, plan with their fellow members of the community, prepare schedules of work, estimate expenditure, distribute responsibilities, supervise the progress of projects and insure their successful completion. It should also be the responsibility of lay leaders to discover potential leaders from the rest of the community and help them to go through all the stages of training and orientation. As many people as are willing to share the responsibility of development projects should be involved as miniature leaders.

10. As time goes on the lay leaders may start serving as the two-way channel between the community and the specialized agencies. This may have to be done not with the intention of by-passing the Village Aid Worker, but with the motive of relieving him of some of his duties to enable him to increase his scope. And in the final analysis, the development and maturity of a community has to be judged in terms of its self-reliance and independent action.

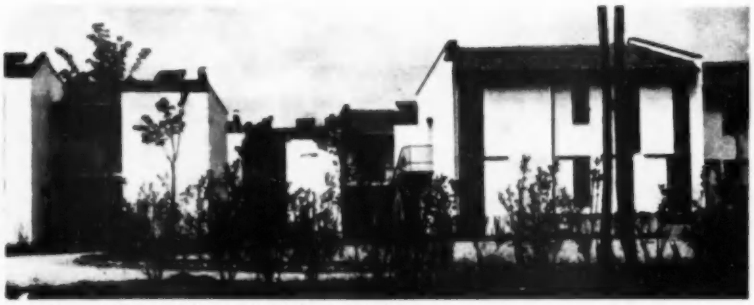
Studio BPR (Belgiojoso, Peresutti and Rogers)
HOUSES FOR METALLURGICAL WORKERS IN SESTO SAN GIOVANNI, MILAN, ITALY
"Architectural Design," October 1959, Volume XXIX. Pages 405-406.
Illustrations
728.31 (45)



Above: front elevation of the houses showing gardens and planting in front of each

Houses for metallurgical workers in Sesto San Giovanni, Milan, Italy

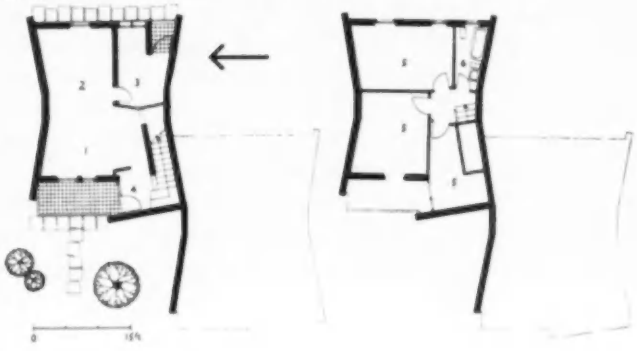
Studio BPR (Belgiojoso, Peressutti and Rogers)

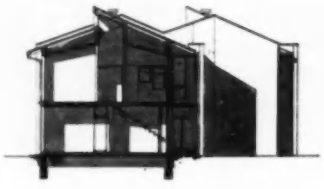


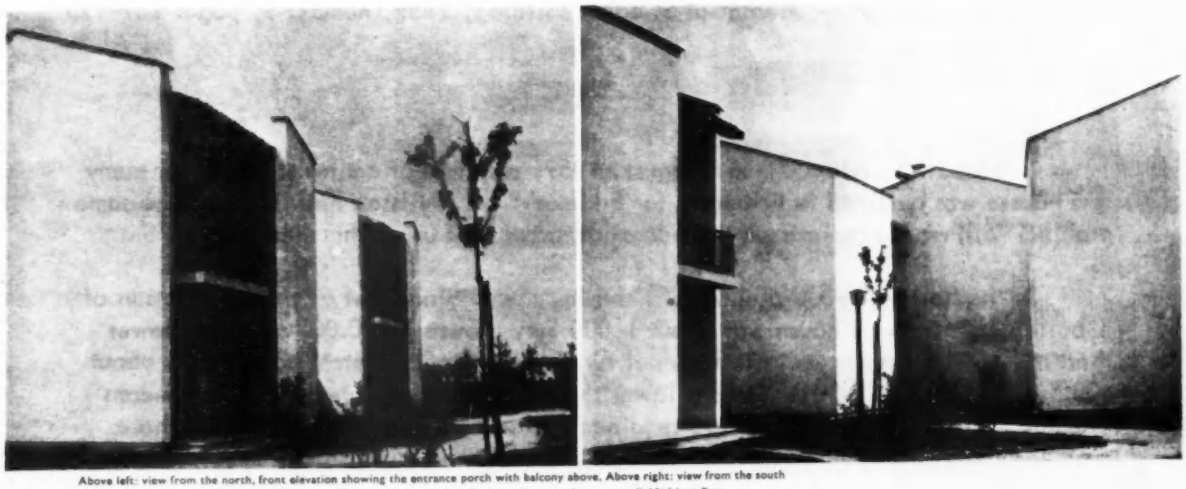
This group of fifty houses was designed in 1957 for a new residential quarter in Milan commissioned by the C.E.C.A. (European Confederation of Coal and Steel) to provide houses for metallurgical workers. Forty-five of the houses are ordinary two-storey houses; but five (the row to the top left of the central green) are divided into flats, one up and one down.

An interesting pattern of togetherness and privacy has been created by setting the houses back and fore, and by the use of blank walls. Each entrance has a patch of grass and planting in front of it.

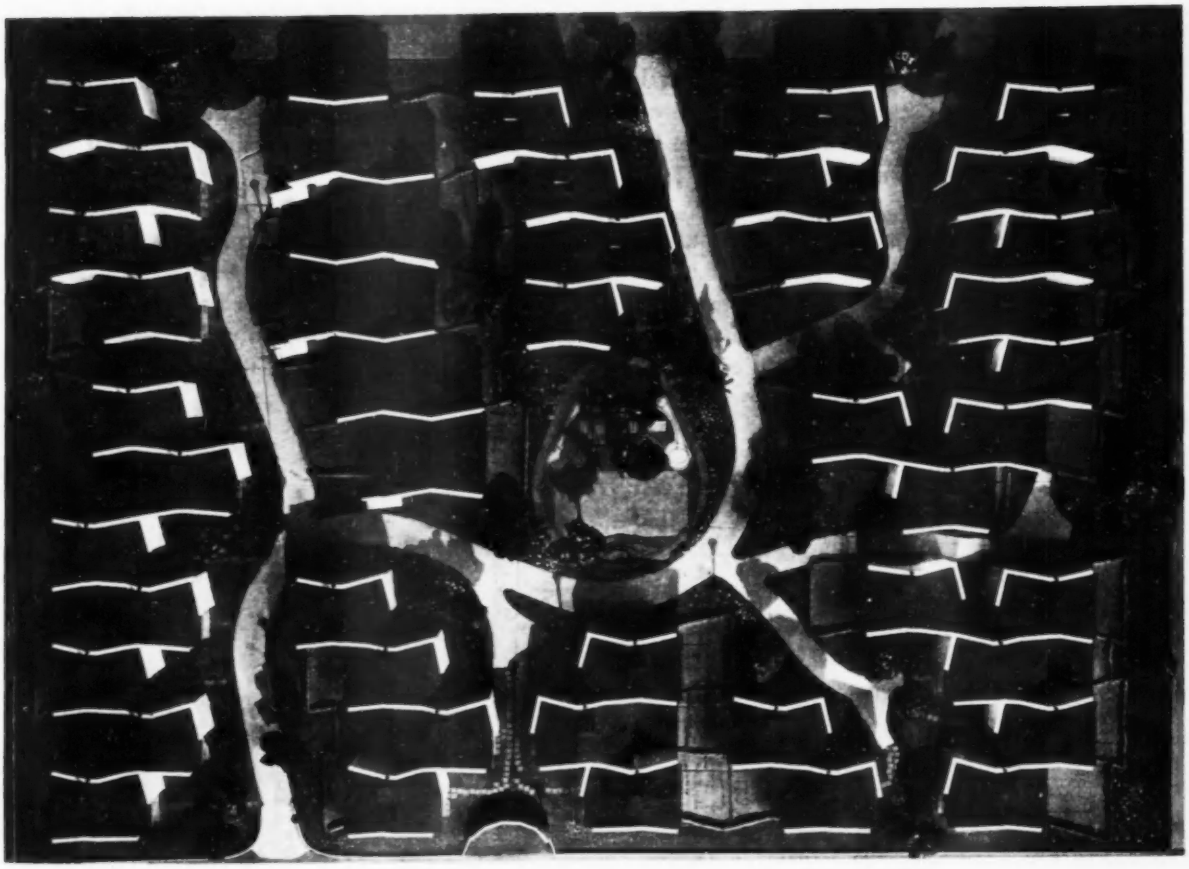
Above: general view showing the way in which the houses are linked together
Below: ground and first floor plans. Key: 1 living 2 dining 3 kitchen 4 entrance 5 bedroom 6 bathroom
Below right: section







Above left: view from the north, front elevation showing the entrance porch with balcony above. Above right: view from the south
Below: plan of the model scheme of fifty houses. The five houses to the left above the central green are divided into flats



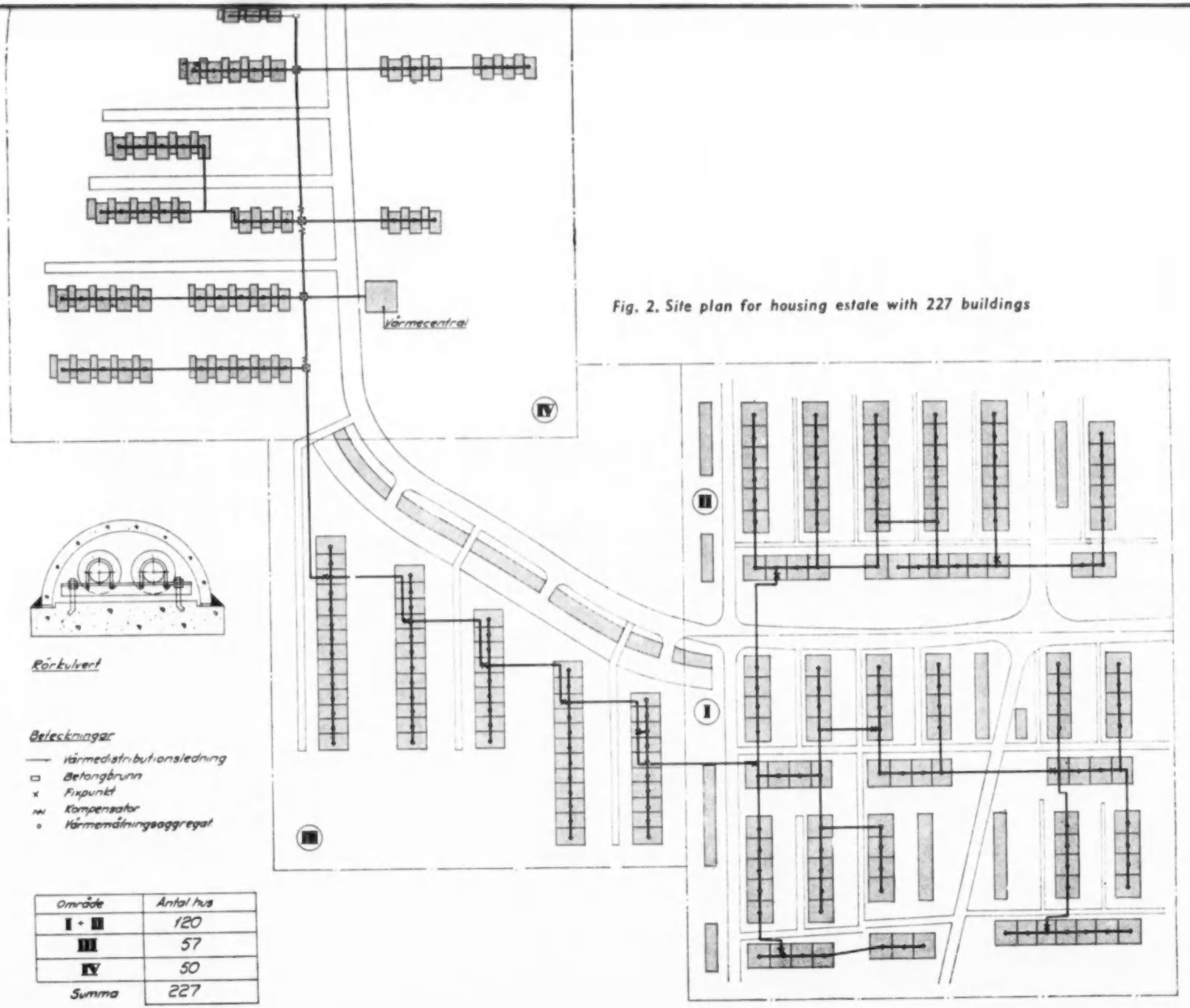
Nilsson, R.
HEATING OF HOUSING GROUPS
"Byggmästaren" - Journal of Swedish Building, 1959, number 9, pages 189-195
Illustrations.
697.34 (211)

1. In EKISTICS, HIB-GA-46, August, 1959, a system of central heating for many row houses was outlined in "Housing for Eskimos." R. Nilsson has discussed the same problem with more emphasis on the economic aspects of using this method.

2. In the housing group of 227 units shown, the original cost of the installation of a boiler room in each house was about 1,000 Sw. crowns ($200.00 American) lower than a central boiler house. The annual running costs of a central boiler were about 600 Sw. crowns ($120.00 American) lower than individual heating units: this means that the extra installation costs are regained within two years. The basis for these costs are taken from investigations made by the National Swedish Committee for Building Research.

3. The economical advantages of the central boiler house can be larger in more densely built up groups than that chosen for investigation. This means installation costs would be nearer for the group or individual unit. The investigation demonstrates, however, that a central boiler house can be economical even for less densely built up areas, so that even areas with single family houses can often be economically served by a central heating plant.

4. It has been said that the function of housing groups is to provide a residence for each house-hold at the lowest cost and it is sometimes proposed that the individual builder system increases the feeling of independency. It should however be the opposite: the private owner is much more independent of his heating in a well-designed heating plant if it is a central one, since the house-holder is released from its care.



Område	Antal hus
I + II	120
III	57
IV	50
Summa	227

Fig. 2. Site plan for housing estate with 227 buildings

Conference on Demographic Problems
SOCIAL DEVELOPMENT AND MIGRATION
The Caribbean, Vol. 13, No. 8, August, 1959. pages 150-153.
312:325 (729)

1. This article was adapted from the Report of the Conference on the Demographic Problems of the countries served by the Caribbean Commission, with the assistance of Mr. G. W. Roberts, Vital Statistics Adviser, Government of The West Indies. The Caribbean Commission is a consultative and advisory body established in October 1946 by the Governments of the French Republic, the Kingdom of the Netherlands, the United Kingdom, and the United States of America.

2. The Conference generally agreed that the objectives of social policy were to raise levels of living by the creation and expansion of economic opportunity, improved social security, better housing, old age pensions, educational facilities, etc. These things were desirable in their own right and also important because they were necessary for economic development.

3. The main problem was one of choosing desirable social objectives, with due regard to their possible effects on population expansion and population policy. Many measures of social policy might have the effect of increasing and not decreasing population growth. Thus, the adoption of certain countries of the Caribbean region of social security policies based on the needs of more developed countries, such as family allowances, could stimulate population growth. Similarly, social welfare programmes aimed at promoting legal marriage among certain groups of the populations could, as an immediate result, raise the birth rate by increasing exposure to the risk of pregnancy.

4. On the other hand, there were other aspects of social policy likely to have both a direct and an indirect effect on family limitation. Of these measures education was considered the most important. There is considerable evidence, both from countries within and without the Caribbean, that fertility levels are closely connected with levels of education.

5. It has been found both in Puerto Rico and the British West Indies that appropriate social techniques in agricultural education have led both to increased production and to a more informed and self-reliant peasantry. This suggests that corresponding methods of community education at the adult level may make it easier for the population to accept the principle of family limitation, which depends so much on social, moral and cultural factors. Where failure to limit the number of births lay in ignorance, simple educational measures would be sufficient; but more deeply rooted culture factors might have to be taken into consideration. These factors would naturally affect the speed or slowness with which practices of family limitation would be adopted.

6. Migration. Migration was discussed in terms of five principle factors:

(1) the "push" or conditions and aspiration of peoples in the sending country inducing them to emigrate;

(2) the "pull" or the demand for labour and the other factors in the receiving country which attract workers from abroad;

(3) the communication and transport facilities between the sending and the receiving countries;

(4) the effect of emigration on the sending country;

(5) the effect of immigration on the receiving country.

7. For the peoples of the Caribbean, the effect of emigration provides problems both for those who stay in their island-home and for those who leave. The draining off of the more skilled workers is probably the most serious disadvantage for the sending country. This is compounded by the fact that no large nation has ever really reduced severe over-population by emigration alone. In Puerto Rico, the Planning Board expects emigration to continue at a level of about 50,000 per year for the next twenty years but that the population will also continue to grow unless birth rates are lowered.

8. In receiving countries the immigrant is most likely to move into the slum areas and poorer neighbourhoods of large cities. Many times the poverty of the areas in which he lives is attributed to his presence, though, in reality, the area was poor before he entered it. Still, because of the exploitation and over-crowding to which he is often subjected, he may contribute to the further deterioration of his immediate neighbourhood.

9. If, in a given period, the number of immigrants into a country does not correspond with the new jobs created, or if the immigrants do not enter the country under specific contracts of employment, then they may well have to compete with local workers for work. The immigrant is usually "the last to be hired and the first to be fired," and therefore in periods of depression he adds to the rolls of the unemployed. On the whole, however, he fills shortages in the labour force and thus makes a valuable contribution to the receiving country.

10. Friction between immigrants and residents of the receiving country arise in the course of their normal interrelationships. The presence of new racial groups, with their different ideas, ideals, attitudes and habits, has, always given rise to misunderstanding between immigrants and residents. The latter either refuse to

consider the newcomer his equal, or holds him in open hostility. However, contacts in factories, schools, civic groups, labour unions, churches and voluntary organizations can help to reduce such conflicts.

11. Means of limiting population growth. There was general agreement on the right of each individual to determine the number of children he has in accordance with his own normal principles. Delegates failed to agree about the acceptability of mechanical and chemical methods of birth control, and a programme of research aimed at showing how the population problems may be approached without the use of these methods were forbidden by law.

12. In this connection reference was made to studies of attitudes of working class populations in Puerto Rico and Jamaica. These considered existing attitudes towards family size and its control as well as the use of education as a means of showing how the number of children might be controlled and the benefits that may result from such a choice.

13. Other studies, designed to examine the relation between birth rates and social and economic development, also appeared necessary. These were of particular importance because most of the ideas that might be applied in West Indian schemes of development were probably generalizations drawn from the experience of populations differing greatly from those of the Caribbean. Close and continuing studies into rates of population growth and the degree of economic development of Caribbean countries was also urged.

14. In summary the research called for was much wider than studies in formal demography or formal sociology. This should be directed towards:

(1) The improvement of agricultural production.

(2) The development of geological resources.

(3) The development of markets for Caribbean products.

(4) The development of new educational policies and methods.

Bogue, Donald J.

THE USE OF PLACE-OF-BIRTH AND DURATION-OF-RESIDENCE DATA FOR STUDYING INTERNAL MIGRATION

United Nations Seminar on Evaluation and Utilization of Population Census in Latin America. 30 November-18 December, 1959, Santiago, Chile. Mimeographed. 43 pages.

325.33 (100) (8) (72) (729)

1. Donald J. Bogue is a permanent staff member on leave from the Population Research and Training Centre, University of Chicago to the Regional Centre for demographic training and research in Asia and the Far East, Bombay, India. This paper for the seminar was prepared by Mr. Bogue, with review and additional research by R. M. Sundrum and K. C. Zachariah.

2. Throughout the world the streams of migration from rural to urban areas are approaching flood proportions, and persons charged with the responsibility of designing the censuses of 1960-61 are being requested to furnish more detailed information than ever before concerning internal migration. Not infrequently this movement of population is happening in countries where the volume of internal migration hitherto has been quite small. This annual transfer of millions of people from villages and farms to cities is destined to continue for at least a century, for it seems to be an inevitable side-effect of technological development.

3. The following discussion has three goals:

(1) It undertakes to make a complete inventory, in schematic form of the potentially useful migration tabulations that can be made from census information concerning place of birth and from a question concerning duration of residence.

(2) It evaluates the precision of the statistics that these tabulations produce, specifying both the types of valid inferences and the probable or possible limitations and inadequacies of the data.

(3) It maps out briefly what might be considered an ideal or complete census programme of migration statistics such as would be deemed necessary or desirable by persons charged with planning practicable programmes of national economic development, urban housing, expansion of employment opportunities at particular sites, welfare, education, or other topics of municipal, state, or national administration that involve migration or the effects of migration.

4. Estimating Lifetime Internal Migration from Place-of-Birth Statistics. The most basic migration tabulation that can be derived from place-of-birth data is illustrated in Table 1. This table is constructed by cross-classifying each respondent's place of birth with his place of residence at the time of the census enumeration. Such a table separates the entire native-born population into two major groups:

(a) Non-migrants-persons who, at the time of the census are living in the place of their birth,

(b) Migrants-persons who, at the time of the census are living in a place different from that of their birth.

5. The second group, the migrants, is further subdivided into migration "streams," or flows of persons between place of birth and places of residence at time of census. For example, in Table 1, there appears to have been a stream of 62,000 migrants from the state of Massachusetts to the State of New Hampshire, and a stream of 18,000 migrants from New Hampshire to Maine, etc. The diagonal cells of this table specify the number of non-migrants, or persons who at census time were living in the place of their birth. When this table is studied by rows, all cells except the diagonal classify in-migrants to a particular place of residence according to the places of their birth. When this table is studied by columns, all cells except the diagonal are interpreted as a classification of out-migrants from particular specified places of birth according to the place of present residence.

6. This analysis gives only lifetime migration which must not be confused with current or recent migration. There is no way of determining, from a single census enumeration of place of birth, the volume of flow during the span of a year, a decade, or any other fixed interval. Nor is there any assurance that the flows which are shown did not occur years ago; migration during the last few years preceding enumeration may have been quite small, or of a completely different pattern from that shown by the lifetime migration estimates.

7. Inspection of Table 1 shows that between each pair of places two streams of migration flow in opposite directions. Some persons born in place A have migrated to place B, and some persons born in place B have migrated to place A. By subtracting the opposing streams between pairs of places it is possible to estimate the streams of net lifetime movement between each place of birth and every other place of birth. Table 2 illustrates this calculation.

8. Estimating Inter-censal Internal Migration from Place-of-Birth Statistics. If place-of-birth data are available for two consecutive censuses, estimates of inter-censal migration may be obtained by subtracting the place-of-birth data for the later census. This procedure should be used if at possible, for all experiments show that lifetime migration bears only a very general relationship to recent migration. Newly developing streams of movement tend to be masked by earlier movement of people.

Table 1. Dummy table illustrating basic place of birth tabulation (Data from U.S. Census of 1950)

(thousands of persons)

Place (State) of residence, 1950	Native born population, total	Place (State) of birth					
		Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut
Native born U.S. Total	139,772	958	499	433	4,126	669	1,534
Maine	832	726	18	4	40	3	5
New Hampshire	471	20	327	23	62	3	5
Vermont	346	3	15	270	18	1	5
Massachusetts	3,948	75	63	41	3,308	53	53
Rhode Island	674	6	5	3	68	508	15
Connecticut	1,699	24	12	16	90	19	1,209
etc.							

Table 2. Dummy table illustrating estimates of streams of net lifetime migration derived from place of birth data (Data from U.S. Census of 1950)

(thousands of persons)

Net migration of following States with respect to every other State	State						
	Maine	New Hampshire	Vermont	Massachusetts	Rhode Island	Connecticut	etc.
Maine	-	- 2	+ 1	-35	- 3	-19	
New Hampshire	+ 2	--	+ 8	- 1	- 2	- 7	
Vermont	- 1	- 8	-	-23	- 2	-11	
Massachusetts	+35	+ 1	+23	-	-15	-37	
Rhode Island	+ 3	+ 2	+ 2	+15	-	- 4	
Connecticut	+19	+ 7	+11	+37	+ 4	--	
etc.							

9. Estimates of inter-censal migration arrived at by differencing successive censuses suffer from a serious deficiency: they count as migrants all persons who die during the inter-censal interval while living outside the place of their birth. Such deceased persons are treated as in-migrants to their place of birth and as out-migrants from the place of residence at the census where they were last enumerated. Such deaths therefore tend to reduce the estimates of out-migration from places of birth and to reduce the estimates of in-migration to places of census-time residence. The only effecitve correction is to cross-tabulate the place-of-birth streams by age, and then to apply survival ratios to the data for the earlier census to make allowance for deaths during the inter-censal period.

10. The Precision of Estimates of Migration Prepared from Place-of-Birth Statistics. The following factors have a deleterious effect upon place-of-birth data.

(a) Boundary changes.
(b) Special customs that affect place of birth, for example in India a high percentage of women return to the father's household to bear the first child.
(c) Return migration.
(d) Incorrect reporting of events from the distant past.
(e) Mortality of migrants and multiple moves.
(f) Inability to report data for individual cities.

Thus, this adds up to the fact that there is a high percent of error. The average error in estimating the amount of net migration is well over 50 per cent, both in the United States and India. In addition, state-of-birth estimates consistently underestimate the amount of change that has taken place through net migration.

11. Estimating Internal Migration from Duration-of-Residence Statistics. A question determining how long the person has lived in a certain place provides information of an estimated date at which migration occurred. It stratifies the lifetime in-migrants in migration cohorts, or groups of persons who migrated during the same interval of time. These are the survivors of the actual cohorts that migrated during the indicated periods. The cohorts that actually arrived at the specified places have been decimated from two causes: further migration and death.

12. The various cohorts of in-migrants differ from each other in one important respect --the length of time they have had to adjust to the new community. Persons who have had ten years or more of residence may be assumed to have adjusted almost completely, to the point that they are almost indistinguishable in their status from non-migrants, whereas newcomers may be assumed to be experiencing a wide variety of difficulties. This hypothesis can be tested by cross tabulating duration of residence with compositional characteristics of the population. The hypothesis which would underlie the analysis is that the greater the duration of residence the more similar the composition of migration cohorts would be to the composition of non-migrants, holding constant age, education, and other related factors.

13. The Precision of Estimates of Migration Prepared from Duration-of-Statistics. The errors in the data would arise from two major sources:

(a) The tendency for longer-term residents to be classed as non-migrants.
(b) The tendency to mis-report the span of residence.

The errors would probably be no greater than those found among place-of-birth statistics and probably less so for duration of residence less than two years.

14. Use of Duration-of-Residence Classification in Conjunction with Place-of-Birth Classification. Some rather interesting and promising possibilities emerge when the simultaneous use of duration-of-residence and place-of-birth categories is considered. If one is willing to accept the conventional place-of-birth assumption that there has been only one migratory move, namely, directly from place of birth to place of enumeration at the census, the duration of residence question can be used to subdivide lifetime in-migration, out-migration, and net migration streams into migration cohorts, and hence to allocate them to specific intervals of time.

15. A System of Migration Statistics. The ideal practicable system is a combination of a question of duration of residence supplemented perhaps by some place-of-birth tabulations. Barring this, the next most desirable question concerning "where were you living x years ago?" choosing the value of x to be some interval that would be suitable both for the study of streams and the study of characteristics. The present author favours a span of two years, but five years is probably meaningful, especially where the volume of migration is low. The most important and most basic task of migration analysis, that of estimating net current migration, should be accomplished by methods which do not require any special migration inquiries at all, but only age distributions.

16. The objective of this paper has been to destroy unwarranted expectations of precision, but not to discourage efforts to do the best possible with available information. One of the most heartening things about migration analysis is that valid and useful findings shine through even poor data. Therefore, it is very important that each nation make whatever migration tabulations it can, using place-of-birth, duration-of residence, or direct inquiries concerning previous residence as may be available. These tabulations should be as refined and detailed as the tabulating budget and the data will allow. In analyzing these data, all possible skills should be employed to make corrections and adjustments. In the next few decades, migration phenomena are going to loom so large on the demographic horizon of nations undergoing economic development that any information, no matter how gross, will be appreciated.

Chandrasekaran, C.

THE USE OF SAMPLING TO EXTEND AND SUPPLEMENT INFORMATION OBTAINED FROM POPULATION CENSUSES.

United Nations, Seminar on Evaluation and Utilization of Population Census Data in Latin America. 30 November-18 December, 1959. Santiago, Chile. Mimeographed Paper. 17 pages.

312 (100)

1. Mr. Chandrasekaran of the Regional Centre for demographic training and research in Asia and the Far East, Bombay, India, originally prepared the paper with the findings and recommendations of a regional Working Group of Experts on Sampling Methods held in Bangkok in September, 1959. While it was prepared specifically with Southeast Asia in mind, the ideas set forth are applicable to the Latin American region and other underdeveloped areas in the world.

2. The demand for extensive and reliable demographic data is growing in most countries of the world, and especially those engaged in the task of planning for economic and social development feel this need keenly. The population censuses have been one of the chief sources of information on a national basis, but census programmes even in more advanced countries are now unable to meet all the requirements. Censuses are expensive and if all the needs were to be met through the traditional census method of complete enumeration and wholesale tabulation of the data collected, the cost, time and organization required would place a serious strain on the resources normally available for census-taking. The use of sampling methods in population censuses has of late afforded the opportunity of getting much additional information which would otherwise not be available. In addition the application of modern sampling theory has also opened up new ways in which information on economic and social characteristics of the population can be obtained by means other than population censuses. Such sample surveys, however, depend largely on the information provided by censuses for their proper execution. In the present day, therefore, the census and sampling procedures are not competing techniques and should be looked upon as interrelated parts of a concerted programme of data collection and research.

3. Sampling allows additional information in the census, for instance in the Indian census of 1959 age, literacy, civil condition and maternity were determined on a 10 per cent sample, and tables on household size and composition were obtained from a 4 per cent sample. After a census is taken, however, there are often a variety of circumstances where data in addition to those obtained in the census are required. This is true in the working out of plans for economic and social development. Data on family budgets, levels of wages and earnings, under-employment, health and housing are required. Although such information has to be obtained through sample surveys, the data obtained in the censuses have to be used in the planning of these surveys.

4. Conclusions of the Working Group of Experts, Bangkok, 1959.

(a) It is essential to divide the entire country into territorial divisions, sub-divisions and small area units. The main criterion is that they should have precise boundaries, identifiable on the spot and operationally convenient. It would be of further advantage if maps of these areas, even sketch maps prepared by non-specialists, were made available. Areas defined by such maps are more useful than those demarcated by lists of houses. In the formation of geographic units, it is advisable to consider both the rural and urban areas at the same time in order to deal effectively with the border problems.

(b) The kind of classification of areas adopted must depend on the situation in the different countries, particularly the level of statistical development and demand for statistics. Villages may well form the units in rural areas. Large villages and towns will have to be further sub-divided into enumeration districts. In making such sub-divisions the clarity of boundaries and operational convenience should be given greater weight than the desire to approximate uniformity of size in terms of population or area.

(c) It is important not only to demarcate small aeral units but also to make available the basic information in regard to population size, agricultural area, etc., for these units. The available information for small aeral units should be kept in one or more central places if it is to be conveniently available.

(d) It is doubtful if data for sampling units smaller than the enumeration districts can be provided; for example, the preparation of household lists is not of great value as it is difficult to keep up to date.

(e) The Working Group recommended that the programme of work in regard to the preparation of sampling frames should be built up as an integral component of census programs. The extra cost involved in the preparation of frames and maps and in assembling information for small units should be balanced against the continuous gains that would result when these are used for the planning and execution of numerous sample inquiries.

Benjamin, Bernard

DEMOGRAPHIC INDICATORS OF THE LEVEL OF LIVING

United Nations Seminar on Evaluation and Utilization of Population Census Data in Latin America, 30 November-18 December 1959, Santiago, Chile. Mimeographed Paper, 20 pages.

312:36 (100)

1. EKISTICS HIB-GA 45, July, 1959, included an abstract of the "Report on a Coordinated Policy Regarding Family Levels of Living" by a working group of seven experts. They made recommendations for a co-ordinated policy regarding family levels of living, particularly in the application of broad programmes of social security, social assistance and related social services for family and child welfare. Bernard Benjamin, of the General Register Office, London, has prepared a paper for the Santiago seminar which gives means of measuring the level of living. To fulfill policies regarding the family living levels, it is important first to have a technique for measuring this level.

2. The Role of Demography. If the need is to measure relative degrees of economic development, it would be most appropriate to seek direct indicators of this change in terms of food supplies, industrial production, investment and savings. By definition, however, an under-developed economy does not need, and does not produce the necessary political pressures to provide sophisticated indices of economic organization. On the other hand most of the under-developed countries are experiencing population pressures. The general dimensions of these pressures are obvious without measurement, but the formulation of any economic, medical, or population policies to deal even with their worst effects requires a statistical appraisal of the present demographic situation and of current trends.

3. It is not merely that demographic indicators are likely to be developed before more direct economic indicators are available: some of these population measures have been demonstrated to be so highly correlated with economic indices as to entitle them to consideration in their own right. On grounds both of availability and of efficiency the Committee of Experts, convened by the Secretary-General of the United Nations jointly with the International Labour Office and the United Nations Educational Scientific and Cultural Organization, gave priority to indicators in the following way:

a. Expectation of life at birth.
b. Infant mortality rate.
c. National average food supplies in terms of calories at the "retail level" compared with estimated calorie requirements.
d. Proportion of children 5-14 years of age attending or enrolled in schools.
e. Percentage of population literate, above some appropriate age; total and by sex.
f. Proportion of economically active population unemployed.

g. Percentage distribution of economically active population by principal industrial and occupational categories.
h. "Personal consumption" as a proportion of national income and index of changes therein.
i. Macro-economic items related to national income.
j. The ratio of the index of change in national income (in constant prices) to the index of change in population.
k. Average expectation of life (at birth and) at various ages.

4. The basic requirements of a demographic indicator of the level of living may be briefly stated:

a. It must be highly correlated with, and sensitive to, changes in the whole complex of economic and biological factors (food, clothing, shelter, education, well-adapted employment, cultural use of leisure, physical fitness, etc.) that constitute the accepted attributes of a high level of living.

b. It must also be sensitive and discriminating. Among a number of indicators for a set of countries of differing levels of living one would choose that with the highest variance.

c. It must be comparatively simple in arithmetical structure and derivable either from equally simple population census data or from a combination of such data and that of quite rudimentary vital registration systems.

d. As well as being simple in structure, it must be capable of interpretation in terms of commonly accepted and simple concepts, in the interests of wider appreciation and international comparability.

e. It whould be comparatively insensitive to small distortions in the demographic structure of the population.

5. Population Composition. Countries which are economically under-developed usually have high and stable birth rates and very high mortality, especially at younger ages. The population pyramid is wide at the base and low in height; it forms a flat triangle. Developed countries have often passed away from a period of high fertility to a period of low fertility and their mortality is relatively low, again especially at very young ages; in consequence the population pyramid presents itself as a high peak triangle representing longevity superimposed on a narrow rectangle representing recently declining fertility. It is therefore natural to regard a high proportion of old people (say aged sixty and over), or a low proportion of children (say aged under fifteen) as indicating advanced economic development. Since both of these

groups are for the most part economically inactive, these proportions are, for want of a better term, referred to as dependency ratios. In another context they do indicate the economic pressure of dependency but in this content, since they indicate the stage of economic development, it would be preferable to refer to them as age-composition indicators of economic development. The following figures are illustrative:

	Census Year	Age Composition, Per Cent		
		Under 15 Years	15-59 Years	60 years and Over
Argentina	1947	30.9	62.6	6.6
Brazil	1950	41.9	53.9	4.3
Ceylon	1946	37.2	57.4	5.4
Chile	1952	37.4	56.2	6.5
Costa Rica	1950	42.9	52.4	4.8
India	1951	37.4	56.9	5.7
Japan	1950	35.4	56.9	7.7
Mexico	1950	41.8	52.7	5.5
Paraguay	1950	43.8	50.2	6.1
Venezuela	1950	42.0	53.5	4.5
Range per cent of mean		33		40

6. On this basis Argentina, Chile and Japan appear more developed than the remainder. Mexico, India and Ceylon--a high proportion of old and low proportion of children--is not well separated or clearly capable of classification, though the first two of these ought to be shown as less developed. Paraguay appears to be somewhat anomalous since it has a high proportion of young and old. Statistics of population composition thus satisfy the basic requirements of c and d in paragraph 4, but hardly meet requirements of a and b .

7. The Labour Force. Another aspect of population composition derivable from the population census is presented by the economically active population, especially in relation to the proportion dependent upon different branches of activity such as agriculture (the primary sector), manufacture (the secondary sector), services and distribution (the teritary sector), and the proportion not employed at all. It is not possible to include sufficient unemployment indices to provide adequate illustration. The illustration used is to show labour force by industry type for the same countries used in the example of population composition.

8. Generally, it may be expected that highly developed economies will have low porportions dependent on agriculture and high proportions dependent on trades and services. In this example Argentina, Chile, Japan and Venezuela appear as more developed and Brazil, India, Ceylon, and Mexico as less developed. The position

of Venezuela must be regarded as anomalous and Japan does not get the leading status which she should have in this group. Nevertheless the dispersion is fairly wide, the correlation with development is good, and the sensitivity is high, satisfying the basic conditions necessary.

		Percentage of Labour Force In		
	Year	Agriculture	Industry	Trade
Argentina	1947	26.7	30.1	43.2
Brazil	1950	60.7	13.1	26.2
Ceylon	1946	52.9	10.3	36.8
Chile	1952	29.7	28.9	41.4
Costa Rica	1950	54.7	16.2	29.1
India	1951	73.9	9.9	16.2
Japan	1954	45.2	22.3	32.5
Mexico	1956	60.8	16.8	22.4
Parguay	1950	53.8	18.8	27.4
Venezuela	1950	41.3	18.4	40.3
Range per cent of mean		94	109	86

9. Infant Mortality. The history of all economically developed countries shows that at least beyond the earliest stages of industrialization, infant mortality is a sensitive index of the level of living. In order to measure exogenous mortality factors (mainly infection and accidental injury) and to exclude endogenous factors (such as prematurity, congenital malformation and birth injury), it would be most appropriate to calculate the post-neo-natal mortality rate, viz. deaths under one year of age less deaths in the first four weeks of age, per thousand live births. However, in less developed countries it may not be possible to make distinction of deaths after the first four weeks of life. Further, in the absence of birth and death registration it may not be possible to calculate the infant mortality rate (deaths under one year of age per thousand live births) directly and it may be necessary to use a rate of mortality estimated from census data. In the latter case it may be advisable to extend the age period to include deaths under the age of 5 to facilitate estimation.

10. Expectation of Life at Birth. The choice of expectation of life at birth as the first priority of the United Nations Committee of Experts is understandable for it is an age standardized index compounding the mortality not at one age but at all ages. It is a readily understood concept and indeed is generally accepted as one useful way of summarizing the age-specific mortality rates of a particular country in a particular period.

11. It is necessary to inject here a special warning in relation to all mortality measures. The special massive anti-malaria campaigns and other internationally

organized health programmes of the last decade have had a dramatic effect upon mortality rates and may well have disturbed them from levels which would otherwise be exhibited in the prevailing economic conditions of particular countries. This is likely to have affected the extent of correlation between mortality and levels of living.

12. Literacy. Illiteracy is conceptually incompatible with a high level of living. To remove illiteracy requires an organized system of primary education and this itself is a concomitant of economic development. A priori the proportion of the adult of population which is literate should be a good indicator of the level of living. The following illustrative figures are available:

	Year	Per cent literate in population 15 years old and over	
Argentina	1947	86	
Brazil	1950	49	
Ceylon	1953	65	
Chile	1952	80	
Costa Rica	1950	79	
Japan	1948	98	
India	1951	19	
Mexico	1950	57	(6 years and over)
Paraguay	1950	66	
Venzuela	1950	52	
Range per cent of mean		122	

13. Japan, Argentina and Chile appear correctly as more developed countries and India, Brazil and Mexico as less developed countries. In this illustrative group the dispersion is quite wide, and the indicator appears to be well correlated with and sensitive to changes in economic development. A simple concept and a simple computation are involved. There is no real need for age standardization so long as the calculation is restricted to the adult population.

14. School Attendance and Educational Level. The proportion of children 5-14 years of age enrolled in schools might serve for a time but this rapidly approaches unity and becomes insensitive. In these circumstances it would be preferable to calculate an index more directly related to contemporary advances in the intensity of education. UNESCO has suggested as an indicator "the median number of years of formal schooling completed by the population 25 years old and over."

15. Housing. Good housing conditions are an essential component of a high level of living and if the recommendations of Principles and Recommendations for National

Housing Censuses are adopted considerable data will be available from the 1960 Censuses. Indicators which suggest themselves are:

a. Number of persons per room in permanent housing units.
b. Proportion of population living in housing units with
    (1) piped water supply
    (2) water closets
    (3) fixed baths
    (4) electricity

16. Internal Differentials. Hitherto the discussion has mainly implied international comparisons but it is essential to take account of differentials in the level of living within a particular country. Rapid advances in particular centres may not be reflected in a national average indicator, which is held down by a lack of progress in wider areas outside these centres. Indeed a wide dispersion of level of living indicators within the country may itself be an indication of economic immaturity. It is important therefore that census tabulations should provide for some break-down by areas within the national territory.

17. Comparisons in Time. It is not enough to know that a country is under-developed, some attempt must be made to measure the rate of progress of development in order to assess the need for, and subsequently the efficacy of, any special measures of economic aid or of governmental stimulation of effort. Inter-censal comparisons give a measure of progress, but ten years is a long time to wait for indications of movement. It may therefore be desirable to institute ad hoc sample surveys during inter-censal periods in order to assess changes which have taken place. Where there is a reliable system of birth and death registration this will not be so necessary, as such indicators as infant mortality, expectation of life, etc., can be regularly calculated.

18. Conclusions. It would be premature to draw final conclusions when much needed trials must await the results of the 1960 national population censuses, but the following views may be set down in summary form:

a. Demographic indicators of proven efficacy can be produced provided certain basic census-type statistics are available.

b. These indicators gain in importance because they are likely to be universally available long before economic statistics, which emerge at a later stage of economic development, are generally provided.

c. Of those indicators examined in this paper, it seems likely that the age composition indicator and the infant mortality rate, though the simplest, may be as good as any.

Jenkins, G. Neil

FOOD, HEALTH AND POPULATION — A WORLD PLANNING PROBLEM
Advance Proof: Town and Country Planning Summer School, Overseas Section, Southampton, 1959. Printed. 9 pages.

1. G. Neil Jenkins sets the population situation, with which planners are so concerned, into its wider context affected by food and health. He presents a stimulating review of the problem to date and outlines the various approaches possible in regard to the situation in the future.

2. The modern world is confronted by two major problems and the measure of our success in solving them may well determine the course of human history for centuries ahead. The first is the prevention of nuclear war--a moral and political problem. The second is that of equating food supplies (and other human needs) to the present and future populations of the world--which is a problem of planning on the grand scale. Some believe these two problems to be related and say that until world nutritional levels become adequate, international tensions and the risk of world war will continue, but I personally doubt this. I hope I am not being too cynical in saying that none of the H-bomb powers feel sufficiently strongly about the welfare of the ill-fed parts of the world to make this issue a cause of hostilities. Contrary to popular belief, hunger and malnutrition lead to apathy rather than anger, so that ill-fed countries themselves are not likely to resort to total war.

3. World nutrition. One of the first tasks of the Food and Agricultural Organization (FAO) of the United Nations was to collect information upon which to judge the size and nature of its problems. This it did by conducting two world food surveys, the results of which were published in 1946 and 1952, referring to pre-war and immediate post-war conditions respectively.

4. Vital statistics, body weight and height measurements and so forth all show an appallingly low level of general health in under-developed countries (although not very different from the European figures of a century ago) but the relative importance of nutrition, sanitation, absence of medical services and racial factors are difficult to disentangle. We may conclude definitely that there is evidence of malnutrition although whether on the scale suggested by FAO is uncertain.

5. The population problem. The present trend of world population is, of course, a factor greatly exacerbating the food situation and more than nullifying some recent attempts to increase per capita food intakes. During the hour taken to read this paper, about 10,000 people will have died throughout the world. In that same hour 15,000 babies will have been born. The hourly excess of births over deaths is 5,000; 120,000 day by day; 40,000,000 year by year. The increase is not of course uniformly distributed. Latin America is among the highest, then North America and the Far Eastern countries; Europe being the lowest. One result of these variatons is that, with

the exception of the USA, populations have increased most in those countries with the smallest rise in food production. Although since 1952 world increases in food production and population have kept pace with each other, this is a misleading picture. In fact, the well fed have been eating a little better and the ill fed a little worse.

6. Thus we are confronted not with the food problem alone or the population problem alone, but with one inter-related problem: food production keeping pace with population increase. It is a matter of great regret that these points should ever be considered apart, as they often are.

7. Increasing food production. Possible methods of increasing available food can be divided into two types. First are the comparatively modest schemes which will enable farmers with their existing land to increase their output. The second are the spectacular plans for extending the areas of agricultural land, for fusing together small holdings into large units where mechanization is economic, or for revolutionizing food production by introducing such things as factory-made food yeast in place of farm crops. Since FAO has no capital, countries' advances and aims are mostly of the first type. This may be a blessing in disguise because there are still too many unknowns to guarantee the success of the schemes which require large capital. By and large, the urgent need is for the development of methods by which the small farmer can improve his output.

8. Prevention of soil erosion and other losses. It is ironic that in spite of the urgent need to increase food production, the area of useful land is shrinking in many countries as a result of soil erosion. Loss of food stocks through insect pests and plant diseases is not confined to any one country or group of countries; few people realize, for instance, that in England the loss of food through pests is equivalent in value to the work of some 50,000 skilled employees every year. In India, three million tons of pulses and grain are lost every year to mildew, rodents, and insects, etc. In fact, about one-fifth of the world's food is lost in these ways. This is twice the amount that goes into international trade.

9. There are many food plants (sugar cane, banana, cassava) so thoroughly infected with virus disease in some places that farmers simply accept the wizened unhealthy crops as normal. It has even been said that if the required action were taken -- thorough destruction of all plants and the replacement by fresh virus-free stocks -- farmers would reject the new as unrecognized new-fangled plants. If crops throughout the world were as healthy as the average in England, yields would probably double and the world's food problem disappear. A similar result would probably be achieved by more widespread use of fertilizers, which are still unknown in many parts of the world.

10. New foods. It is not generally realized that out of several hundred thousand varieties of plants, fewer than a hundred are used on a large scale as sources of food; similarly only fifty out of two million species of animals make significant contribution to human food. The reasons why primitive man chose these particular plants and

animals were presumably unrelated to nutritive value but such things as ease of harvesting or catching, portability, feasibility of extracting edible portions and cooking were probably decisive. These advantages are no longer necessarily valid. We know little enough about the nutritive value of Western staple foods, but our knowledge of the food value of so far unused plants is negligible. For all we know, the vitamin and protein content of many plants now growing wild in the jungles of the world may exceed those of the accepted foods.

11. The main obstacle to this is human conservatism. People tend not to like, or even refuse to try, the unfamiliar. But some new foods have been quickly adopted and have had revolutionary effects on agriculture and food habits, the potato being the classical example. It was introduced from the New World in the time of Elizabeth I and rapidly became a staple crop in Europe -- with disastrous effects in Ireland in the 1940's.

12. Plant breeding. In addition to making a wiser selection of the plants which have evolved naturally, agriculturists have for a long time improved on nature by selective breeding. In recent years, a more adventurous approach has been possible, partly because modern transport enables us to bring together for crossing purposes, plants which grow naturally in widely separated places and also because superior technical knowledge has overcome certain practical difficulties. The field trials are still awaited of apparently successful laboratory experiments by FAO of grossing Indian rice (with a poor yield and growing only in the tropics) and Japanese rice (yields much higher but grows only in a temperate climate).

13. Fish. In many Eastern countries a fisherman and his family go a few hundred yards off the coast in a home-made boat and catch enough fish for their own meal. The development of fisheries in the Far East has received much attention by FAO, especially fish farming in inland waters. The production of fish ponds has, of course, been going on for centuries, especially in some parts of the Far East. Particularly important from the foodstuff point of view is that a well-stocked fish pond can produce far more protein than any other type of livestock operation. Furthermore, experiments have shown that, where rice is grown under water, the flooded paddy fields can be stocked with fish to produce some 300 pounds per acre, so that in addition to the rice crop, there is a harvest of fish. Irrigation ditches can also be stocked with fish and, in fact, any stretch of water can now be made suitable for rearing fish.

14. Land reform and other socio-economic factors. Systems of land tenure which lead, for example by laws of inheritance, to very small farms, often prevent progress in agricultural methods because they force people down to the level of subsistence farming. Also, if peasants live under a crippling burden of debt they may have no incentive to increase their output in the belief that an extra will simply go to the absentee landlord or money-lender.

15. Population. There are broadly three views on the population side of the problem. The first is the optimistic one, that food production could be increased to meet the needs, not only of the present population but even of the greatly increased population of the future. This is the official Communist view, reversed only for a year or two by China, which simply denies that there is a population problem but believes that many can mould nature according to tastes.

16. The second is the "do nothing" attitude. It suggests vaguely that population pressure eventually adjusts itself to food supply but it is not always realized what this adjustment means in terms of human suffering. Great faith is placed in the belief that as standards of living rise, so the birth rate falls. There are two fallacies here. First, it is by no means universally true that good living is associated with low rates of population growth, even if the birth rate falls. The population of U.S.A. is growing at 1.6 per cent and India at 1.3 per cent, and some Americans are beginning to worry about the effect of the rising population on their economic standards. Secondly, the approach begs the question because even if it were true that a high economic level is associated with a stable population, there remains the problem of achieving the requisite high standard of living.

17. The most logical position of all, however, would seem to be the third one, namely, that it is better that babies should not be born at all if the outlook for providing them with a rich and abundant life is unfavourable. What are the prospects of success of a world-wide birth control campaign? Some Eastern governments, e.g. India and Japan, accept the need for restricting population growth and spend money on clinics and research. WHO has given some limited help in conducting experiments in India, but is prevented from any major activity in this field by Roman Catholic influence.

18. This review has illustrated the need for planning on every facet of the food and population problem. The disconcerting thing is that we don't really know what to plan for. How much of each food do people need under different conditions of climate and work? What are the most suitable methods of increasing food production? What sized populations must we expect over the next few decades? How can we break the deadlock of a Christian minority hindering the testing and application of new birth control methods amongst non-Christian people?

McLaughlin, Kathleen
SHEEP GETTING NEW LEASE ON LIFE
New York Times, Wednesday, October 7, 1959, pp. 61-62. Illustration.
636 (61) (94)

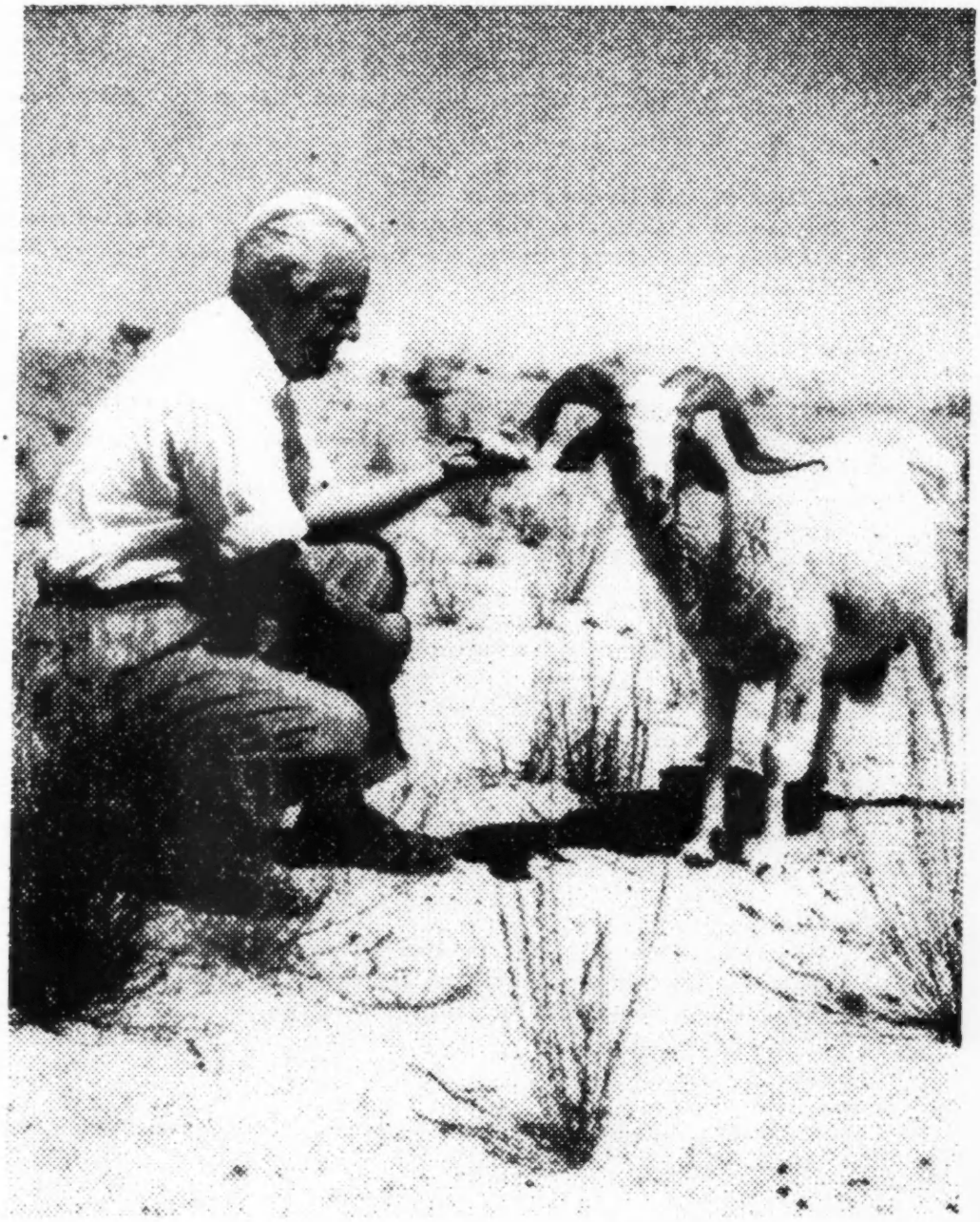
1. In the preceding article, G. Neil Jenkins suggested that by the exchange of information on knowledge of the breeding and raising of plants. In this article Kathleen McLaughlin, a special correspondent to the New York Times, reports just such an exchange, an Australian sheep-breeding expert who introduced modern methods of sanitation and management improving the flocks in Libya.

2. Several thousand fat-tailed Barbary sheep are alive today in Libya that normally would have succumbed in the last year. Some 200,000 others are thriving among the flocks of nomads, largely through the efforts of Malcolm Arnott, Australian sheep-breeding expert, over the last six years.

3. While the score does not yet add up to an impressive total, both Mr. Arnott and the Libyan Government are gratified at the advances made to date in promoting modern techniques of sanitation and range management there. Coupled with other aspects of a project for which the Food and Agriculture Organization commissioned the Australian in 1953, it constitutes evidence of progress in an attempt to alter methods that have remained unchanged for centuries.

4. Two Objectives Noted. Now that the momentum has become perceptible the prospects for a faster pace of development have brightened. In Tripolitania a flourishing experimental farm with 900 selected animals has been left under the supervision of an efficient Libyan trainee. Mr. Arnott will now concentrate upon further experimental farms. This program has twofold objectives: the development of finer sheep with more and better wool, on which to base a rug and carpet industry, and the improvement of living standards among the nomads.

5. Implementation of the latter aim confronted the Australian with baffling difficulties, chief among which has been the conviction of many sheep owners that they were relatively wealthy men, and that their living standards were already high, while the smaller holders displayed little interest. Through persistent, patient activities, and by the owners seeing the comparison of their sheep with those on the experimental farm, visible proof has been at last produced of the owners taking an interest in bettering their own flocks. The owners are now allowing their sheep to be dipped and drenched and treated with insecticides provided by the Ministry of Agriculture and have begun to allow cross-breeding with new and superior strains of sheep from other parts of the world.



Malcolm Arnott of Australia, a sheep-breeding expert, inspects Barbary ram at Sheep Breeding Center in Tripolitania, Libya. Mr. Arnott introduced modern methods of sanitation and management of the flocks at center.

Recent Publications

Duffy, James
Portuguese Africa. Cambridge, Massachusetts, Harvard University Press, 1959. 389 pp. ($6.75)

Hoover, Edgar M. and Raymond Vernon
Anatomy of a Metropolis: The changing distribution of people and jobs within the New York Metropolitan Region. Cambridge, Harvard University Press, 1959. 345 pp. ($6.00)

Michigan State University
What to read on Vietnam. A selected annotated bibliography. Compiled by staff members of the Vietnam project, Michigan State University. New York, Institute of Pacific Relations, 1959. 67 pp.

Narayana, D. L.
Employment and economic development. A study in technical aspects. Andhra University Series, No. 61. Waltair, South India, Andhra University, 1958. 288 pp.

Peach, W. Nelson, Uzair, Mohammad, and Rucker, George W.
Basic data of the economy of Pakistan. Published under the auspices of the Institute of Public and Business Administration, University of Karachi, Oxford University Press, Karachi, 1959. 236 pp.

Pickard, Jerome P.
Metropolitanization of the United States. Washington, Urban Land Institute, 1959. 95 pp. (Research Monograph 2) ($2.00)

Rosen, George
Industrial change in India. Industrial growth, capital requirements, and technological change, 1937-;955. The Center for International Studies, Massachusetts Institute of Technology. Glencoe, Illinois, The Free Press, 1958. 243 pp. ($5.00)

Rosenau, Helen
The ideal city in its architectural evolution. Routledge and Kegan Paul, 1959. 389 pp. ($6.75)

CURRENT WORK OF DOXIADIS ASSOCIATES

THE FUTURE OF PORT SUDAN

A LONG TERM PROGRAM AND A MASTER PLAN FOR THE DEVELOPMENT OF THE TOWN AND ITS REGION

A PRELIMINARY REPORT

Prepared for the Government of the Republic of the Sudan Ministry of Local Government.

INTRODUCTION

Location

1. In January 1959 the government of the Republic of the Sudan entrusted Doxiadis Associates with the preparation of a Master Program and a Master Plan for the Greater Port Sudan area.

2. Port Sudan with a population of 47,600 (1956) is located on the West coast of the Red Sea on a latitude 19°37' North and a longitude 37°13' East. It has developed on the two sides of a natural harbour.

The international significance of Port Sudan is defined as:

a. A pass-through point for the pilgrims to Mecca. Pilgrims mainly coming from French West Africa stay in a special camp for a few days and then they are shipped to Jedda, Saudi Arabia, through the small port of Suakin.

b. A minor air communication key-point for East Africa air-routes.

Nationally, Port Sudan is of much greater significance. It is the only port of the Sudan and through it the whole import and export trade of the country is carried on.

3. Port Sudan is an artificial town created for a particular reason in a location selected only for the fulfillment of physical requirements. No other economic considerations or communication requirements influenced the selection of this location. It is also too young a town to have influenced, as yet, the shaping of the surrounding settlements. The physical obstacles of the sea coast and the Red Sea hills create centripetal forces which will influence the shape of its future development.

4. To the North, Port Sudan is an unpaved road. There are no important settlements in this direction other than a few villages, like Dungunab and Mohammed Qol, whose population lives by fishing. The road is used by the army to communicate with the Halaib district. It is however expected that in the future the development of a mining industry will lead to the creation of major settlements in this area. Should oil deposits be discovered, this expectation would materialize at an even more rapid pace.

5. To the West, the Red Sea hills form a barrier. There are many nomadic settlements on these hills occupied by various tribes. The nomads usually come into Port Sudan to work for a few months of the year and afterwards return to the hills.

6. To the North-West of the town is Arba'at where there is a natural source of water which supplied Port Sudan with water. This area grows cotton and it is believed that as soon as rainwater can be stored, by the construction of a dam, the district will be developed to high class agricultural land.

7. To the South, at a distance of 60 km, lies the town of Suakin. Suakin, a town about 800 years old, was the only port of the Sudan before the establishment of the port facilities in Port Sudan. Now it is on the decline. Ruins and deserted streets give the impression of a town destroyed by war or earthquakes. The harbour is not deep enough to accommodate steamships and the Sudan Railways have removed the railway line to Suakin. Many of the old inhabitants of Suakin have moved to Port Sudan and Sinkat where they now live permanently.

8. Other towns related with Port Sudan are Sinkat and Tokar. Both are growing fast owing to the trend for urbanization. Sinkat is situated 875 m above sea level, on the railway line to Khartoum, about 74 km from Port Sudan. It is adjacent to a mining area and expected to grow when mining development starts. In view of its high altitude it is a popular summer resort among the wealthier inhabitants of Port Sudan. Tokar is the center of a cotton-growing area. Exported cotton of Tokar is transported by road and shipped from Port Sudan.

History

9. In 1903 the subject was raised that Suakin should be improved in order to cope with the anticipated increase in number of ships calling at the only port of the Sudan. At about the same time the harbour of Sheikh Barghout (the present harbour of Port Sudan) was examined for possible use. This harbour was already known and a small village was established at the end of the Eastern promontory, where the holy tombs of Sheikh Barghout are to be found.

10. In 1904 Colonel Ralston Rennedy of the Public Works Department submitted a report in which the possibility of using Port Sudan harbour was examined. Colonel Rennedy was in favour of using the site of Sheikh Barghout for a new town both on account of its harbour and the water supply available. He even drew a plan of the proposed new town.

11. In 1905 a railway line was constructed from Atbara to Suakin. The line was extended to Port Sudan in July 1906. At the same time work was started in the harbour for the construction of the docks which were completed in 1909, when the port was officially inaugurated by the Khedive of Egypt.

12. Until 1940 growth continued at a slow rate. The port and the railway line attracted some new housing development, but the part where the main town is now located did not accommodate more than a few Government buildings.

13. It was between 1940-1951 that extensive building activity contributed to the creation of the main town. This was due to economic reasons dictated by the fact that Port Sudan was needed and used for second world war purposes.

Climate

14. The climate of Port Sudan - temperature, humidity, precipitation and winds - is shown by diagrams compiled from data supplied by the Sudan Government Meteorological Service. It will be noted that:

a. The temperature rises from a minimum in January to a maximum in July. There is a small daily mean variation which attains its maximum of about 20°F in July.

b. Port Sudan appears to have considerably high humidity values during winter time and fairly high values during the months of maximum temperature. This fact causes discomfort during the hot months. The maximum humidity values appear to be in December, the month of highest precipitation.

c. The mean annual rainfall is only 106 mm, a figure which shows that precipitation is on the whole very light. Generally Port Sudan gets most of its rainfall storms in the afternoon to evening or night to early morning hours during the winter months. The summer months, which are the rainy season inlands, are relatively dry. The duration of individual storms varies from 30 minutes to 6 hours. Night storms usually last longer.

d. The prevailing winds in Port Sudan blow from NW to E in summer, and from NW to N in the winter.

15. Strong winds are an important factor to take into account in any long-term plan for Port Sudan.

a. The great majority of dangerous winds occur in summer.

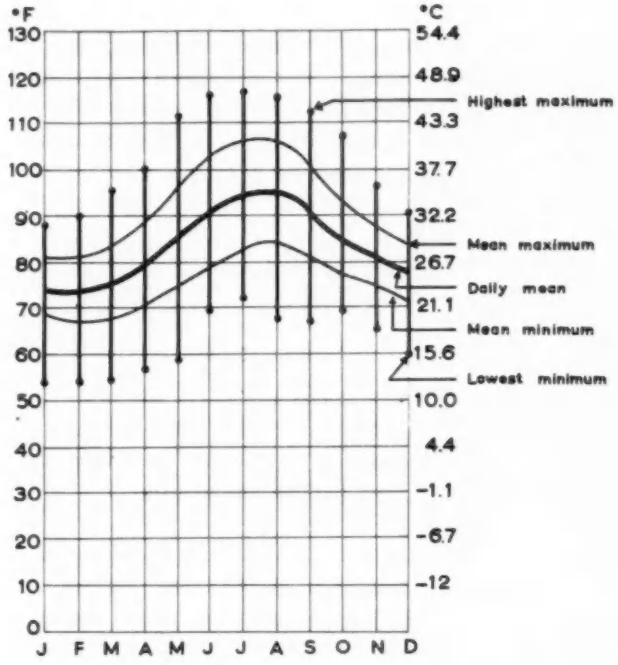
b. Normally the Red Sea hills form an effective barrier against the S-W monsoon that prevails inland. But in some cases the wind finds its way through gaps and, increased by funnel effect, causes damage to property and structures in the town.

c. Rising dust, occasionally developing into moderate dust-storms, may be experienced whenever the wind blows from the prevailing direction between North and West-North-West.

CLIMATIC CONDITIONS

1921—1950

TEMPERATURE



PERCENTAGE WIND DISTRIBUTION

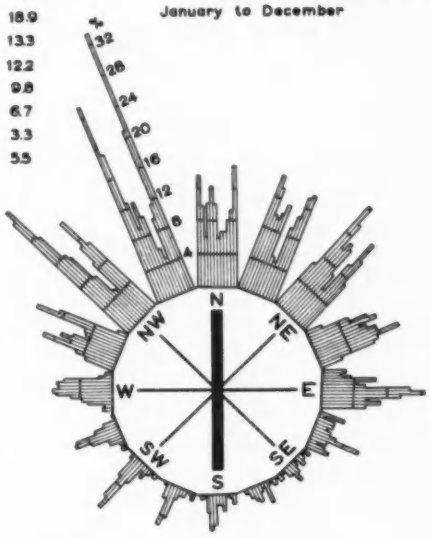
1936—1939

Calm days

J.	2.8 %
F.	4.6
M.	11.7
A.	10.7
M.	12.8
J.	18.9
J.	13.3
A.	12.2
S.	9.8
O.	6.7
N.	3.3
D.	5.5

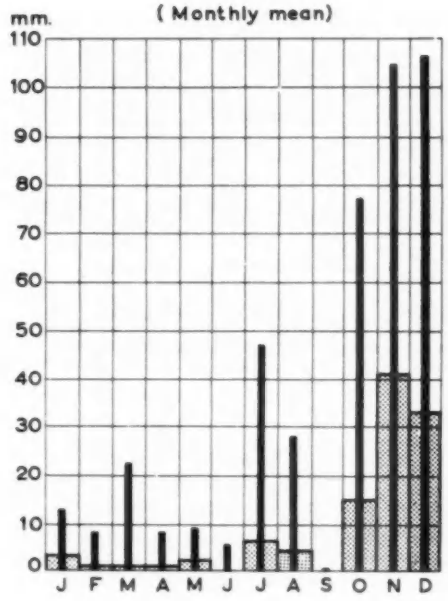
Winds blowing from specified directions at 0600, 12.00, 18.00 G.M.T.

Projecting from each side are twelve columns representing the twelve months of the year working round clockwise from January to December

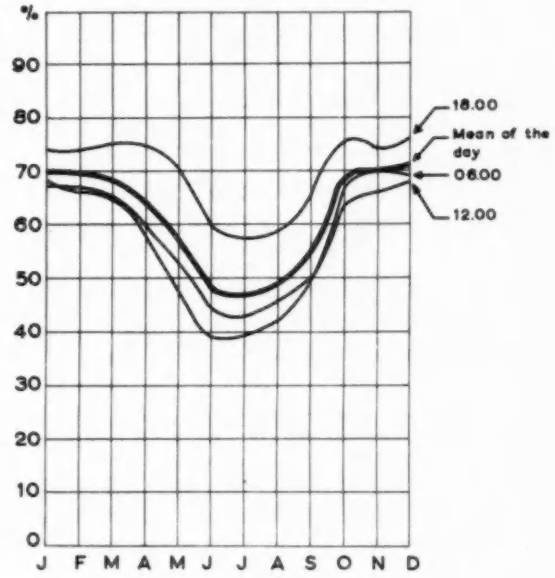


RAINFALL

(Monthly mean)



MEAN RELATIVE HUMIDITY



PROBLEMS

Economic Base: The Harbour

16. The harbour of Port Sudan is a natural sea inlet about 6 km long and averaging 250 m wide. The entrance to the harbour is only 200 m wide. This main inlet separates the East from the West part of the town, while a smaller branch, into which Khor Mog falls, separates the West from the South part. The inlet is divided by a cause-way constructed to accommodate the railway line and join together the East with the West part of the town. The upper part of the inlet being very shallow is unsuitable for berthing.

17. The depth of the harbour varies from 13 feet at some places along the coast to 85 feet at the middle. Almost everywhere the bottom strata consists of coral stone, but the growth of coral presents no problem.

18. Another sea inlet, North of Port Sudan, forms Flamingo Bay, a fairly big but shallow bay, which is now used by fishing boats and in particular by the shell fishing ones. Because of the hardness of the sea bottom, the deepening of this bay by dredging would be a rather expensive proposition. Consequently, the possibility of using Flamingo Bay as a harbour for large ships is very remote.

19. Ships calling at the port cannot have tonnage greater than 30,000 tons, as the maximum draft at the berths does not exceed 35 feet. The number of ships which called during 1957-58 was 1200 ships with an average of 3 to 4 ships daily. The maximum number of ships calling in one day was 9 ships in 1957-58.

20. General cargo is handled on the main quays of the East side. The principal imports are general commercial goods, coal, fuels and sugar. Exports are headed by cotton, ground nuts, durra, maize, sesame, gum and minerals (oil cake and manganese ore). Coal and fuels are handled on the South quays. Fuels include black oils, such as diesel, fumish oils, etc., and white oils such as gasoline, benzine, kerosene, gas oil, etc.

21. The imports exceed the exports by far in tonnage and value as well. During 1957 imports grossed £S 63,339,693 against £S 48,099,400 of exports.

22. At the moment about 40% of the labour force of the population is occupied directly or indirectly with port activities. This number is expected to increase in the future as the port capacity and activities expand.

Economic Base: Shell Industry and Fishing

23. Port Sudan is the most important shell fishing center of the Red Sea. Jedda in Saudi Arabia and Marsawa in Erithrea come next. Only about 100 people live permanently in Port Sudan, but a number of "fishing nomads" all around the Red Sea, come to sell shells in Port Sudan.

24. Table I shows the tonnage and prices of shells in recent years. It will be seen that there has been a continuous drop in the quantity and prices of shells during the past three years. This is due mainly to the international slump in trade due to the competition of plastic recently introduced into the button industry.

T A B L E I

	Trochus			Mother of pearl		
Year	Tonnage	Value £S	Average price £S per ton	Tonnage	Value £S	Average price £S per ton
1951-52	522	68,968	132	113	40,030	354
1952-53	895	61,818	54	179	52,060	235
1953-54	775	57,477	74	120	20,889	170
1954-55	1,032	131,642	140	106	36,252	220
1955-56	800	120,000	150	200	80,000	400
1956-57	605	103,003	170	80	44,317	550
1957-58	561	39,639	74	115	29,966	265

25. The fishing industry has not been developed in the Sudan mainly because of very limited consumption. Fish is not popular with the people and in addition to this, the lack of refrigeration makes it difficult to keep the supply constant.

26. The salt concession in Port Sudan is the main one in the whole country. The production of salt amounts to about 55,000 tons per year. About 30,000 tons are consumed in the Sudan, the remaining being exported. The salt concession area is situated South of the town and occupies 2,000 acres of which 330 are actually used for 30 pans. This area is to be increased by 150 more acres, should 12 more crystalizing pans be constructed. The area is above sea level, the sea water being pumped.

27. The only major heavy industry in Port Sudan is a newly-built oil factory, located behind the East port warehouses. There are 23 light industrial establishments located in a specially reserved zone. There is no area zoned for handicrafts. Handicrafts are usually carried on in individual shops or houses, and they have not been greatly developed.

28. The light industrial establishments are located in an organized zone but a few other industries are situated in a haphazard way. In any case the industrial zone is near the center of the town and its expansion has already been blocked by the adjacent residential neighbourhoods.

Economic Base: Commerce

29. The total number of shops in Port Sudan is very high in relation to the population. This is partly due to the small size of shops. But in the Eastern town there are very few shops and in the South town there are no shops at all. The main market center is located in the center of the town. It is intermingled with administrative buildings and residential areas and its expansion is already blocked. There are no organized local shopping centers.

TABLE VI

	Area	Population	Number of shops	Shops per 1000 people
1	Eastern town	9,564	102	10.6
2	Main town	6,154	1,140	185.2
3	Deim Medina Deim Warsha Deim El Arab	15,102	237	15.7
4	Deim Musa Deim Gabir Deim Felata	14,605	137	9.4
5	Deim Shati South town	2,137	-	-
	Port Sudan	47,562	1,616	34

Communications: Rail

30. The railway is the main means of transportation and communication connecting Port Sudan to the countryside. A great number of passengers and all import and export goods are transported along this line.

31. The railroad line branches off at Haiya Junction some 200 km from Port Sudan, one branch leading to Atbara and Khartoum and the other to Kassala. The railroad route from Port Sudan to Atabara and Khartoum is 474 and 787 km respectively and to Kassala 350 km.

32. The Town Station is located at the North edge of the West town, near the port. A line starting from the Station and passing through the town leads to the docks of the South town. This line as well as the approach line to Port Sudan interfers with the development and the good functioning of the town and should be relocated.

33. The volume of goods and passengers carried by rail from and to Port Sudan during the past five years has increased from 1,034,000 tons to 1,174,000; the passengers from 61,000 to 76,000.

Communications: Road

34. The most important road is the one leading to Suakin and to the cotton growing area of Tokar, because there is no other means of transporting cotton from Tokar to Port Sudan. The same road may serve traffic with Sinkat and the summer resort of Erkowit.

35. The number of circulating cars amounts to 920 only, corresponding to one car per 52 persons, which is a low figure compared to the corresponding number in other urban centers. On the contrary, a great number of bicycles are in use due to the flat topography of the town. It is expected that the use of bicycles will be extended and special tracks will have to be provided on the main roads.

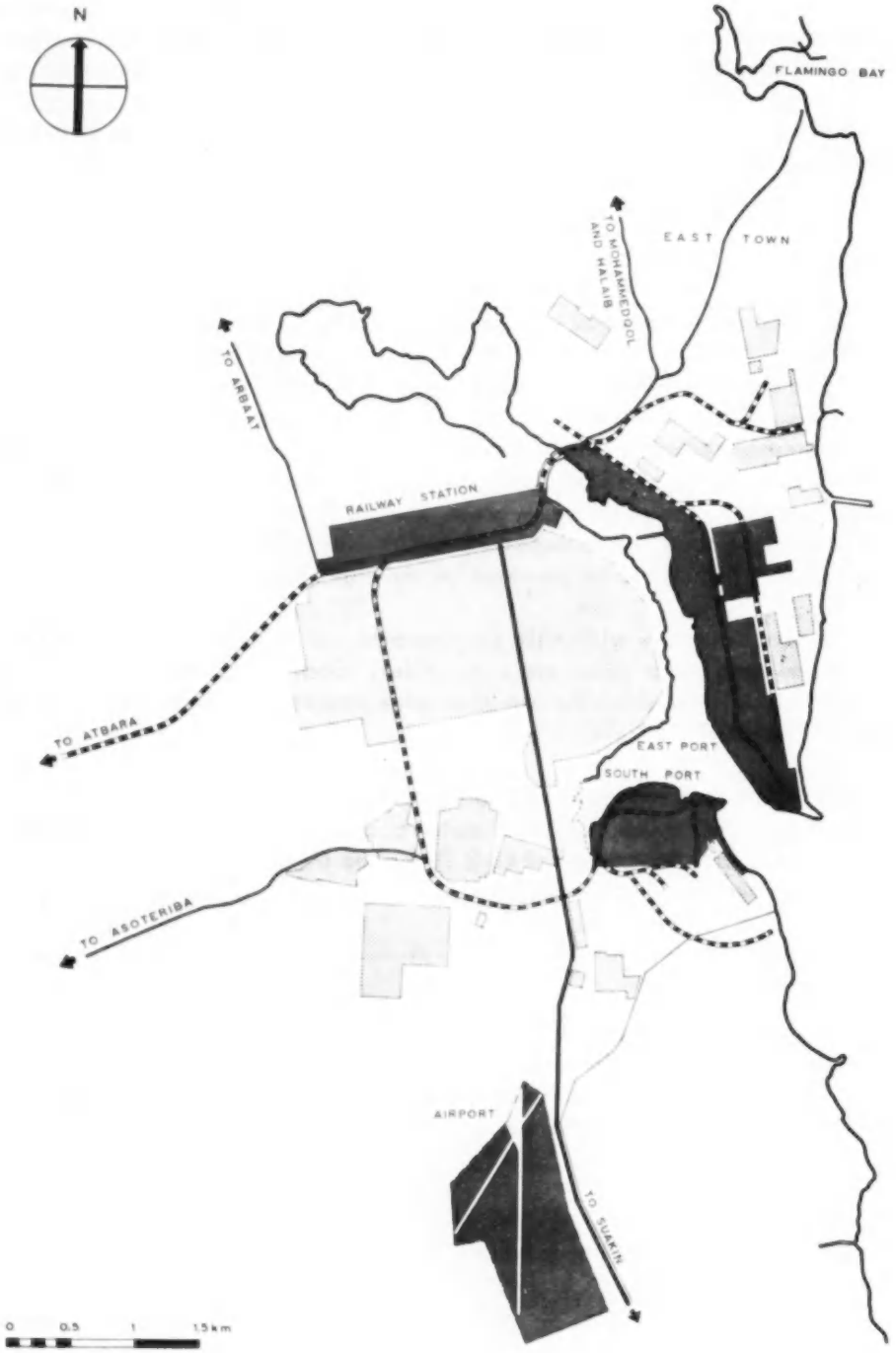
36. The roads are very wide with the standard width ranging from 10 to 25 meters, except a few main roads which are even wider. Even in residential areas proper some streets serving only local traffic are 20 m wide imposing a burden on the Municipalities' budget for the paving.

37. According to the Municipal Engineers dictum the cost of roads in Port Sudan amounts to £S 5,500 m/ms per lineal meter of a six meter wide asphalt paved road, kerbs not included. An amount of £S 2,000 m/ms per meter should be added for the construction of kerbs on both sides.

Population: Growth

38. The growth of Port Suden is due mainly to the movement of population from the rural areas. From information collected, large numbers of male rural populations moved into Port Sudan, during the war and the post-war years, following offers of employment in the port.

COMMUNICATION TERMINALS



PAVED ROADS

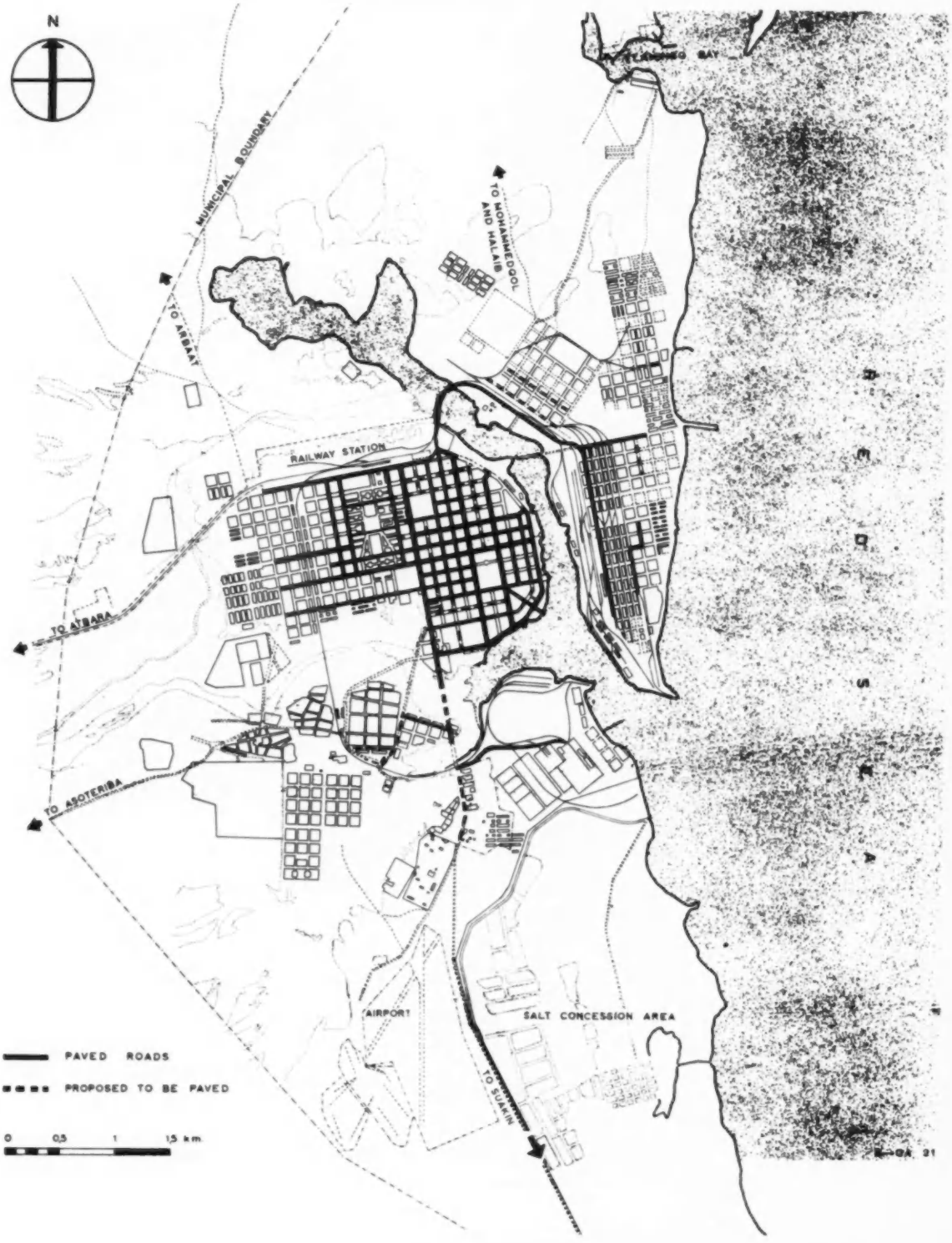

N
MUNICIPAL BOUNDARY
TO ARBAAT
TO MOHAMMEDOOL AND HALAIB
RAILWAY STATION
TO ATBARA
TO ASOTERIBA
AIRPORT
SALT CONCESSION AREA
TO SUAKIN
PAVED ROADS
PROPOSED TO BE PAVED
0 0,5 1 1,5 km

TABLE III

Town	Population	% of the total	Crude birth rate per 1000 p.	Crude death rate per 1000 p.	Excess of birth over death rate	Infant mortality per 1000 births
Sudan	10,262,536	100.00	51.7	18.5	33.2	93.6
Kassala province	941,039	9.17	42.6	17.5	25.1	82.0
10 major urban areas	482,165	-	38.5	14.6	23.9	81.4
Port Sudan	47,562	0.46	38.1	16.2	21.9	130.9

This table shows that Port Sudan has a very high rate of infant mortality, which affects the rate of natural increase.

Population: Age and Sex Structure

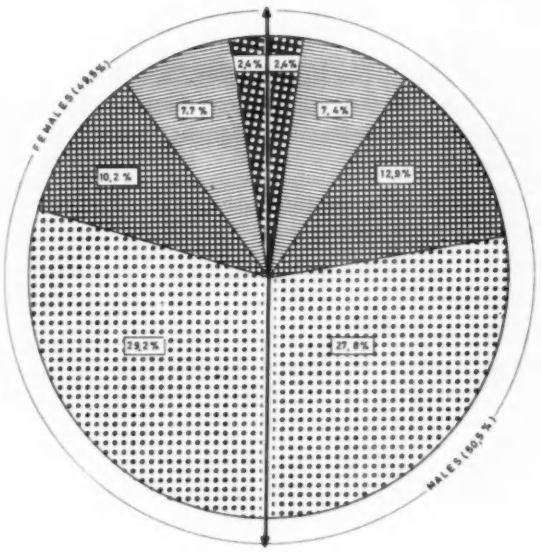
39. A series of diagrams show the age and sex structure of Sudan, Kassala province, the average of the ten major urban areas and Port Sudan. It will be seen that in the urban areas there is a very high percentage of male population. Although there are no striking differences between persons "under puberty" there are huge differences between adult population. The female population "over puberty" makes up 24.8% of the total, but the corresponding figure for the male population is as high as 42.3%.

40. This striking phenomenon is mainly due to the economic conditions prevailing in Port Sudan, which continues to attract large numbers of male rural population in search of employment.

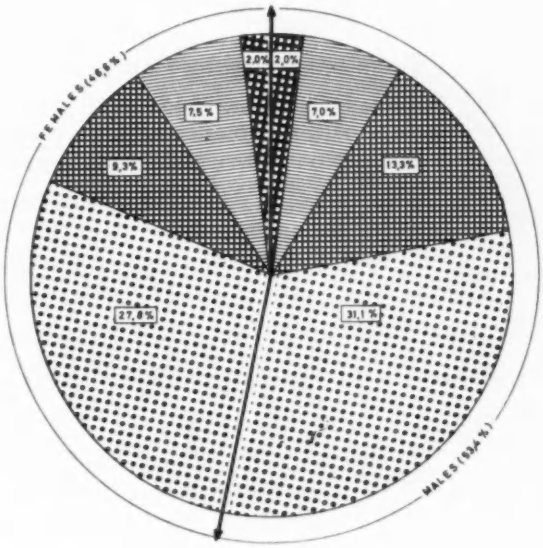
TABLE IV

	Males			Females			Total	
	under 5 years	5 and over to puberty	over puberty	under 5 years	5 and over to puberty	over puberty	all ages	per-cent-ages
Population	2,994	5,638	20,113	3,226	3,791	11,800	47,562	100.0%
Gainfully employed	-	579	18,861	-	163	1,220	20,823	43.8%
Percentage of gainfully employed	-	103%	93.8%	-	4.3%	10.3%	-	-
Unproductive occupations	2,994	5,059	1,252	3,226	3,628	10,580	26,739	56.2%

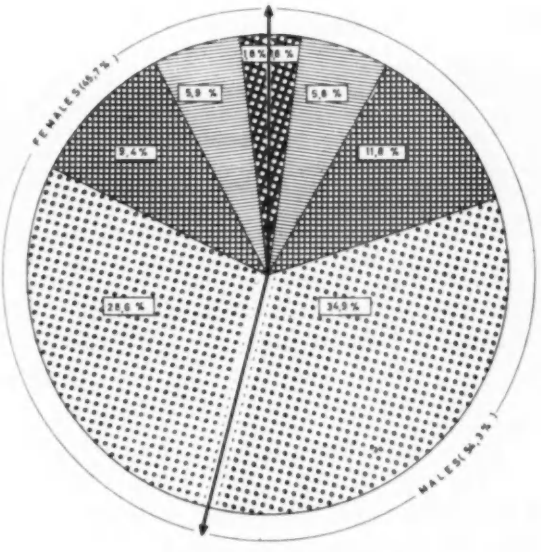
POPULATION STRUCTURE BY AGE AND SEX



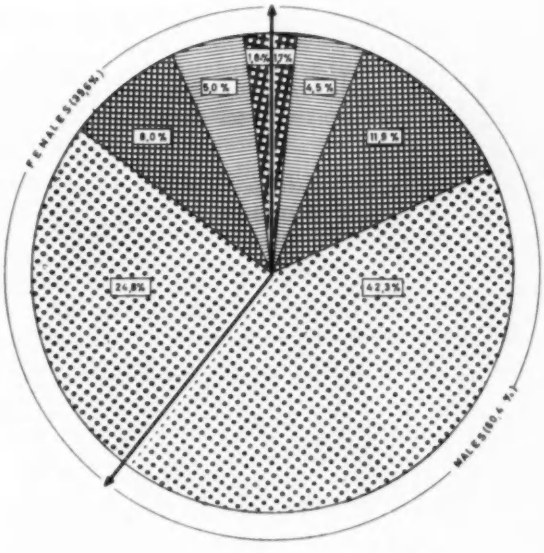
SUDAN



KASSALA PROVINCE



AVERAGE OF THE MAJOR
URBAN CENTRES



PORT SUDAN

Under 1 | 1 and over to under 5 | 5 and over to under puberty | Over puberty

Population: Income per family

41. There are no figures available for the calculation of the income per family in Port Sudan. However, for planning purposes only, the Department of Statistics of the Government of the Republic of the Sudan have supplied the following figures, based on the occupation of the male population over puberty.

TABLE VII

Income group	Port Sudan
Over £S - 1000	1%
500 " - 1000	10%
250 " - 500	40%
Less than " - 250	49%

These figures have been verified by an income sample survey conducted during the basic survey of the town.

42. In addition to this the following information was available:

a. The present national income of the Sudan is £S 284 millions, which corresponds to £S 28 per capita.

b. It is roughly estimated that in future the net national income increase will rise at the rate of 1% annually.

43. It is worth noting that a great number of labourers are "nomadic," not only from the point of view of residence but also in their conception of continuous service. They are averse to working continuously when in town, and they usually tend to move to the Red Sea hills whenever there is rain.

Population: Literacy

44. 43.7% of the male population of Port Sudan and 80.1% of the female population are illiterates. Those are higher than the figures of other major urban areas, but considerably lower than the illiteracy figure of the Kassala province.

Public Health: Water Supply

45. The source of water supply is Khor Arbaat a creek NW of Port Sudan. The water is collected in underground wells, driven in the bed of the Khor and is conveyed to the town by gravity. The waterworks were constructed in 1905.

46. There are no records with regard to the capacity of the wells. The great (6,000 sq.km) catchment area of the Khor Arbaat combined with the annual precipitation (106 mm) indicates that the total quantity of water falling in this area is tremendous. The stormy character of the rainfalls however suggests that a great part of the average annual discharge is lost, flowing into the sea as a torrent. The competent authorities assume that the discharge of the wells, supplemented by new ones, properly driven, would average 15,000 cu.m per diem.

47. The water is conveyed to the town, stored and distributed without any purification. The water, although a little hard, is suitable for all domestic uses in its natural condition. The distribution system consists of a reservoir and several elevated tanks and a pipe network covering satisfactorily the whole area of the town. The main problem is the extension of the distribution pipe system in the town, in order to connect a greater number of houses.

TABLE XVII

Item	Amount
Population	47,562
Households	8,502
House connections	2,695
Percentage of connected houses	31.7
Maximum daily domestic consumption (cu.m)	5,911
Average daily domestic consumption (cu.m)	4,570
Average daily domestic consumption per capita (G.P.D.)	21.1
Average daily consumption of S.R. and ships (cu.m)	1,200

Public Health: Sewerage

48. Port Sudan has at this moment no sewerage system. About 14% of the houses are served by septic tanks, 13% by the bucket system, 12% by water privies, 10% by pit latrines. The remaining houses composing 51% of the total are supposed to be served by the public latrines constructed in the native lodging areas, but Public Health Authorities think that the number of public latrines is not sufficient.

Public Health: Hospital

49. There is one general hospital of 300 beds. Fourteen more beds are allowed for the needs of prisoners and 18 beds are allowed in a small convalescence sanatorium. Although the total of 332 beds represents a standard of about seven beds per 1000 people, this figure is actually lower because the general hospital serves a very large rural district. According to the information collected, the number of beds is sufficient for the summer months but in winter the hospital cannot cope with all cases adequately. The area allotted for the hospital is large enough and the structure of the buildings is in fairly good condition. It lies in the center of the town intermingled with residential buildings.

Public Works: Electricity

50. 38.8% of the houses are supplied with electricity. The demand for new connections was such during the past three years that their number increased by 45%. It is anticipated to reach 5,000 in five years' time. The additional number of consumers that may be served by the existing Power Station is estimated at about 1,800. The annual consumption has increased accordingly. From about 4 million KWH in 1956 the consumption increased by approximately 25% to reach 5 million KWH in 1958. It is anticipated by the local authorities that it will amount to 10 million KWH in five years' time.

Residential Areas

51. The Greater Port Sudan area is composed of three distinct parts separated by the harbour and the Khor Mog.

a. The East town comprising all the main port installations and a few housing quarters.

b. The main town comprising the civic and market center, the light industrial area and further West several residential quarters.

c. The South town comprising the South port, petrol depots, the salt concession area, the aerodrome and further West the native lodging areas.

52. It will be noted that the smallest residential area lies near the port, while most of the lower income people work in the shipping services. Residential areas in the South-West part of the town are very remote from the various places of work.

53. The existing residential districts present the following characteristics:

a. They are classified according to the terms of lease and the restrictions put upon the minimum size allowed for residential plots in each area.

b. The road pattern is usually the gridiron one, with the exception of the old native lodging areas. The roads are very wide despite functional requirements.

c. There is no provision for organized community civic centers, including local shopping facilities, sports grounds, community buildings, etc.

d. In the main town the dwellings are mixed with offices, shops and administrative buildings.

54. The shape of the harbour influenced the direction of the street pattern in some cases, despite the need for a different orientation. Also, Khor Mog and its floods were always a very serious consideration. These two reasons led to the creation of separated housing areas which have no organic relationship with the main town. Even the recent new housing schemes sponsored by the Government are not connected or related to the other parts of the town. The lack of a Master Plan is strongly felt as these expansions follow local requirements without consideration of the overall needs of an economically sound development.

55. Originally, residential quarters were planned in the traditional native way of irregular shapes, narrow streets and very small plots. This trend resulted in high densities and unhealthy living conditions. Examples of this type of planning exist even now in the Musa, Gabir and Fellata deims.

56. In the Western outskirts of the town there is a considerably large "village" inhabited by nomads living in tents. The larger part of the "village" lies outside the municipal boundary and although these nomads work in the town, their settlement is outside the Municipality's control. There is a problem of incorporating this settlement within the municipal boundary.

Housing: Building Materials

57. About 88% of the total number of houses in Port Sudan are built of timber, the remaining being built of stone, bricks or blocks.

58. Only coral stone is available in Port Sudan. Timber is imported from abroad, while brick and cement is transported by train from Atbara. This will be a serious problem to solve for the execution of any large housing scheme.

59. Timber is imported from Europe and in particular from Sweden. Almost all stone construction is carried out with coral stone; basalt or granite is rather rare. All the kinds of stone used are extracted from quarries located near the town.

60. Bricks are very seldom used mainly in the Sudan Railways housing schemes, buildings and structures. Precast concrete blocks of standard dimensions 20 cm x 20 cm x 40 cm and locally made are used instead of bricks. Mud is only very seldom used as building material in Port Sudan the reason being lack of proper kind of soil.

Housing: House Types

61. The courtyard, where there is one, is not used by the family for other purpose than as a passageway, because of the high humidity. On the contrary, "verandahs" are used extensively. In many cases one enters the house through a large verandah facing the street.

62. People do not sleep at all outside their houses, the reason being the high humidity. It is common practice to sleep in the "verandahs." This custom demands a large verandah for each house.

Housing: Building Intensity

63. Building intensity depends on three factors:

a. The relationship of the actual plot area to the area allotted for roads.

b. The relationship of the area occupied by the building to the plot area.

c. The number of storeys.

64. The main town has the lower number of houses per hectare. Housing conditions are appalling in the Deims where an average of more than three persons live in each room. The worst case is that of Deim El Arab.

65. The majority of the dwellings are one-room houses, bringing down the average to two rooms per house, which is a very low figure.

66. Calculation of the relationship of the actual plot areas to the area allotted for roads in the New Deims shows that roads cover 54.7% of the neighbourhood total area. This is a very high proportion and indicates that the planning of this area places a very heavy burden on the Municipality for the provision of community facilities. On the other hand, the town spreads out enormously, creating a lot of problems with regard to land development, public communication costs, vehicular traffic, etc.

Housing: Costs

67. During 1956-57 a very small number of buildings were erected. Also a very small amount of funds were allocated for repairs. However, generally the amount allocated by private initiative is considerably high.

68. The cost of building in £S per square meter of the built-up area may be summarized as follows:

a.	Buildings of stone walls and concrete slab roof	£S 10,500 m/ms
b.	Buildings of precast concrete block walls and concrete slab roof or corrugated asbestos cement sheet roof	£S 6,000 m/ms
c.	Buildings of timber walls and roof	£S 2,000 m/ms

69. The main sources of revenue for the Municipality are the local rates and house taxes. The rates are determined on a basis of 305 m/ms per £S 1000 m/ms of annual rental value of residential premises and of 258 m/ms per £S 1000 of annual rental value of shop premises. The Government pays a contribution in lieu of rates for the buildings used for official purposes. In Government houses rented to officials the rates are paid by the respective tenants.

70. Land value concerning the very few freehold plots of land is not available, because there are no freehold land transactions at the moment. On the other hand, prices of leasehold land are as follows:

a.	First class	£S 2,000 per sq.m.
b.	Second class	£S 1,000 " "
c.	Third class	£S 0,300 " "
d.	In native lodging areas land is allotted free by the Government.	

Community Facilities: Public Buildings, Clubs, Etc.

71. The following customs and habits of the people may affect the neighbourhoods' structure:

a. Community life is developing and in the future a greater number of community buildings for social life and entertainment will be needed.

b. In native lodging areas, where community facilities are not available, people meet each other at the public water stand pipe. This is considered temporary and undesirable.

c. Children now play in the streets, which are full of dust. It is generally recognized that playgrounds are absolutely necessary.

d. People like to go shopping within a walking distance from their house. Local shopping centers should be provided.

e. There are no public hamams but people go to the beach to wash themselves with sea water. They usually go to the beach before sunrise or after sunset believing that such bathing is healthy and curative. To this end special sections of the beach are reserved separately for men and women.

72. The number and size of administrative buildings are sufficient for the present needs. On the other hand, they are so dispersed that they are intermingled with houses, shops and other buildings.

73. There are 16 clubs in Port Sudan, belonging mainly to various nationalities. These clubs are scattered haphazardly in the main town. There are no public halls either in the main town or in the residential communities.

74. The main entertainment buildings are open air cinemas and coffee shops along the main streets, both of which attract a large number of people.

Community Facilities: Public Open Space

75. There are a lot of open spaces around the town, most of them subject to floods, but there are no organized and properly maintained open spaces for the passive recreation of the inhabitants. The only public park lies in the center of the main town, but this does not meet the needs of the people.

76. Football is the most popular sport in Port Sudan. There are about ten clubs which participate in an official annual competition. The existing stadium accommodates about 12,000 spectators - most of them standing and is considered sufficient for the present needs.

77. There are no other organized sports grounds in the town. Any available open space is used as such. Some are located in the middle of the Khor Mog and others at the fringes of the town. This haphazard distribution is a cause of great inconvenience to the players, spectators and the police.

78. There is a nine holes golf field next to the aerodrome. This course is used mainly by a few foreigners and it may have to be moved, should the development of the town require it.

79. At the present the following trees grow successfully in the Port Sudan area.

a. Misquit trees (Procopis duliflaura) which are evergreen and they are grown with a minimum quantity of water. They are considered suitable in protecting the town against sandy winds.

b. Damas (Conocarpas lancifolias).

Land for Extension of Town

80. The area inside the municipal boundary covers a total of 6,500 hectares. Only about 2,300 hectares are used as shown on page 67, the remaining being vacant land. It is obvious that there is no problem of available land. At present all the non-used area around the town is available for development from the point of view of topography and ownership, with the exception of the areas of Khor Mog and the Khor behind the railway station which are subject to floods.

81. Khor Mog is a usually dry watercourse with a wide sand and gravel bed. During the rain season, floods are often experienced due to the great catchment area of the creek and the torrential character of the rains. Floods often affect the area shown on the map. An earth dyke has been constructed to protect the Deim Korea against floods. Khor Mog flows through a prospective expansion area of the town and empties at a vital point of the harbour. It is therefore necessary that floods should be controlled.

82. The other Khor flowing into the main inlet is of minor size and floods do not affect large areas. But here, too, some flood-control works are necessary.

83. Agricultural land is restricted to a small area along the Khor Mog. This is the only place where soil suitability and raised water bank allow for cultivation.

POLICIES

The Functions of the Town

84. The main function of Port Sudan is that it serves as the only port in the whole country. The need for such function was the main reason for which the town was established. The performance of this function at an increasing rate contributed to the rapid growth of Port Sudan. In particular during the second world war (1941-1945) the tremendous influx of population experienced was due to increased port activities.

85. The establishment of the port and the installation of the railway line connecting the port with the other urban centers of the country attracted the first settlers, who were working either in the transport field, or in the construction of new houses and other buildings. They formed the first nucleus of the town which little by little grew and survived. More functions were then created and an additional number of people moved into the town. All these new functions are nevertheless of secondary importance and would not have been developed, if the first basic one did not exist.

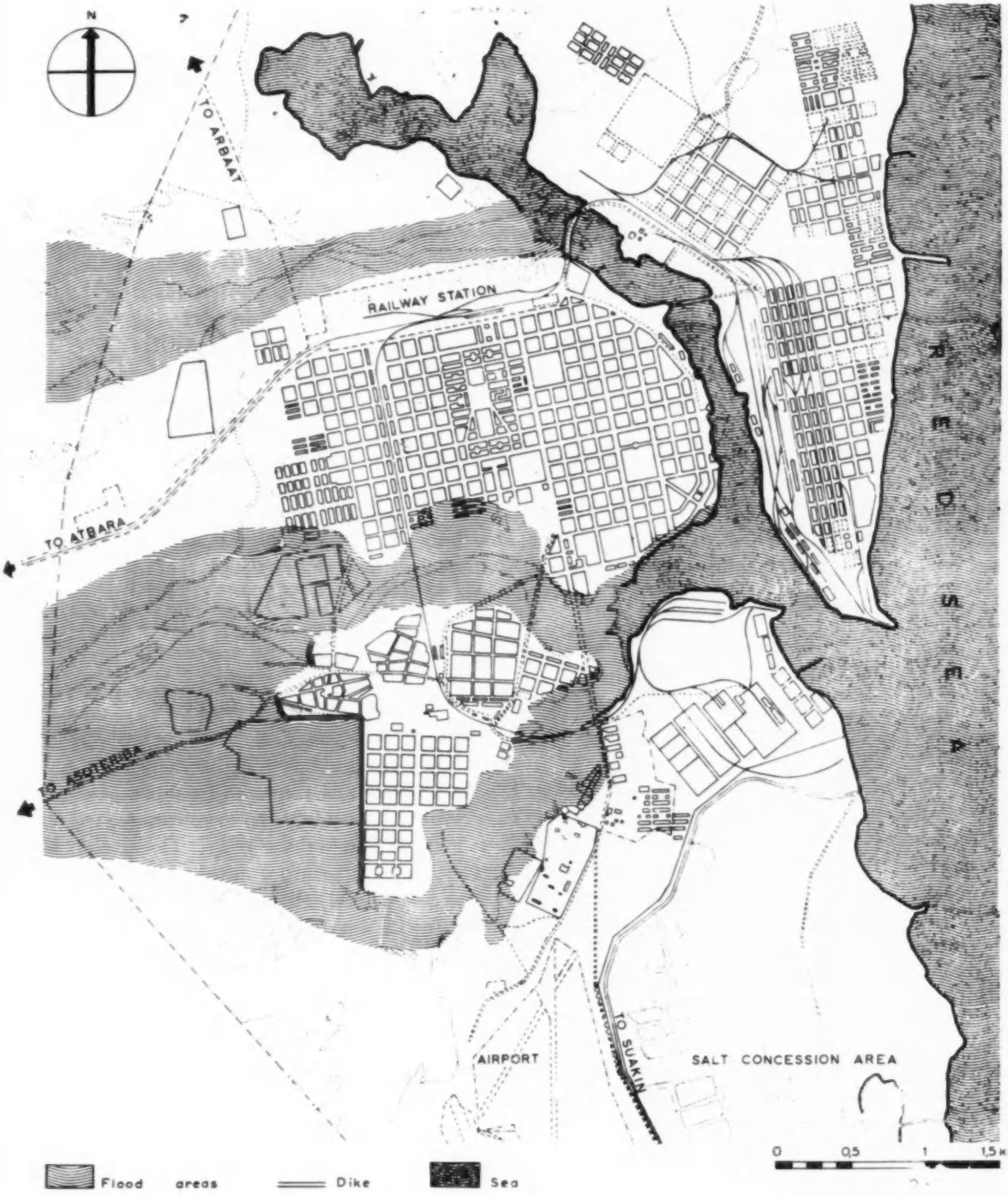
86. The secondary functions are:

a. Port Sudan became a commercial and business center mainly in connection with the port trade.

b. Port Sudan is the administrative center of its district but its significance becomes more important because of the existence of the port.

c. Port Sudan is the largest center of the shell industry on the Red Sea coast.

AREAS SUBJECT TO FLOODS



d. Port Sudan is a small industrial center, the most important industry being the salt concession.

e. Port Sudan is the educational center of the province of Kassala.

f. Port Sudan has the largest prison in the country.

Economic Base: The Harbour

87. Although the potentialities of the Port Sudan harbour have not been fully exploited yet, the fast growth of production centers, namely, mining in the North and agriculture in the South, means that a great increase in the port activities is anticipated in the future. To cope with future demands the responsible port authorities have made the following plans for the extensions of the port facilities, besides the completion of the main quay extension which will increase the present port capacity by one-third:

a. Construction of quays on the East side of the harbour Northwards up to the causeway.

b. Further extension on the West side from the power station down to the marine barracks as a first stage and from the marine barracks down to the swimming pool as a second stage.

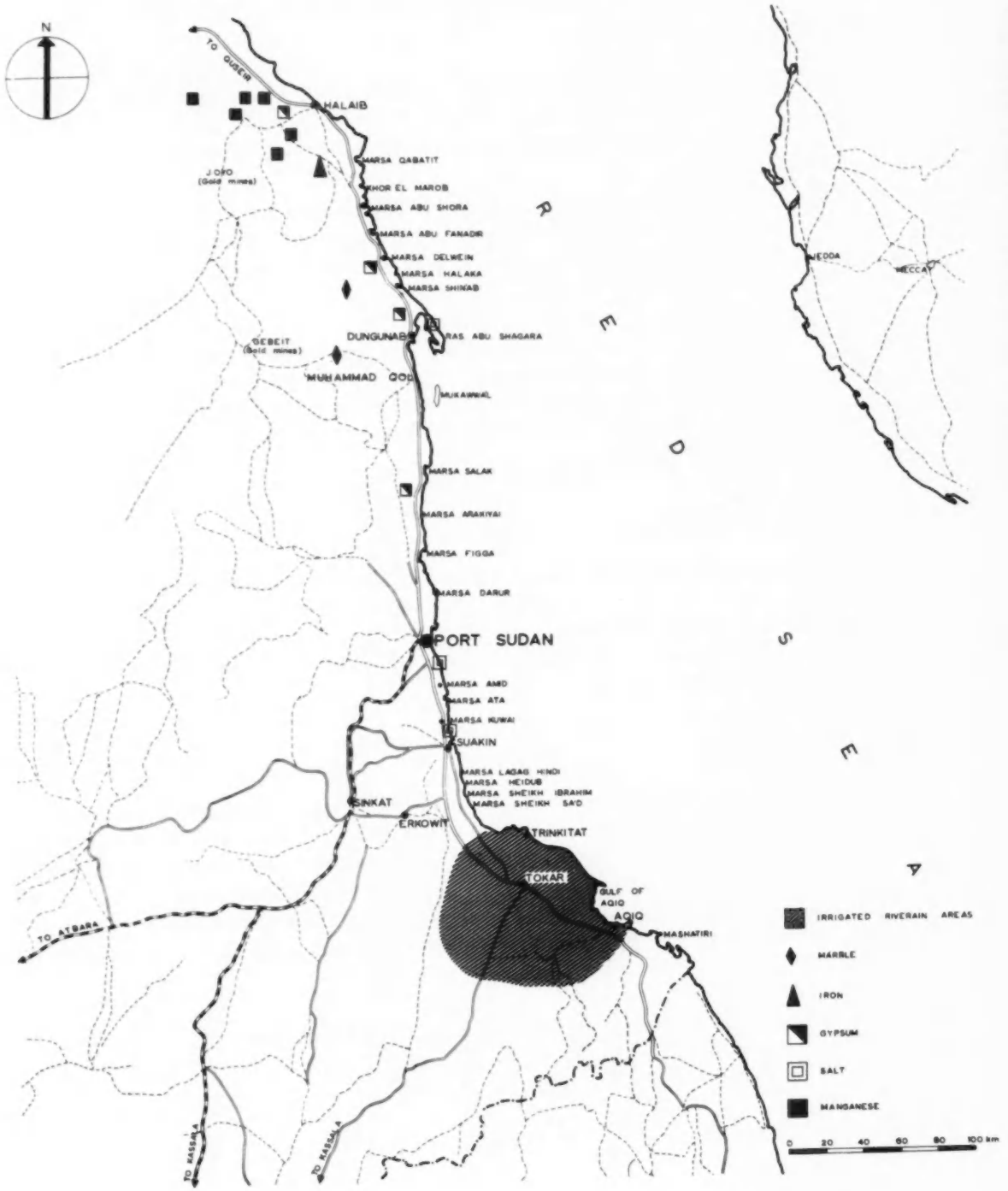
c. Construction of a dry dockyard NW of the one near the causeway. This is, however, planned for the distant future as the port of Port Sudan is not a terminal but a transit port and a dry dockyard will not be needed for a long time to come.

88. The expansion of the port will affect the development of the town from the viewpoint of economic significance as well as of proper town planning requirements. At present this expansion is restricted to the East bank of the harbour only. Consequently, this part of the town will attract more functions, creating greater needs for housing development and business centers. On the other hand, the port authority confronts also problems of improvement and utilization of the existing shipping facilities.

Economic Base Industries

89. The harbour divides the town into two parts. Each part should have places for work, as well as residential quarters, in order that long distances from the residences to the places of work are avoided.

THE RED SEA COAST



90. There is no survey determining the present relation, or the regular movement of people to their place of work. From information supplied by the Municipality the following conclusions may be drawn:

a. Many people now working in the port live in the residential areas of the Western town. Provision should be made for a greater number of housing communities in the Eastern town.

b. On the contrary, light industries are to be provided in the area which will be determined by the direction of the future town's development, in order to give a balance between residence and work place.

c. No matter how many jobs are provided, there will always be a proportion of people living in one area and desiring to work elsewhere. Every effort should therefore be made to provide for a straight and flexible pattern of movement through the whole urban area.

Economic Base: Commerce

91. It is generally admitted that a more rational distribution of shopping centers should be achieved in the future. Each large residential community should be served by a local shopping center, while the main shopping area should remain for the wholesale markets and principally for special needs such as clothing and more expensive household requirements.

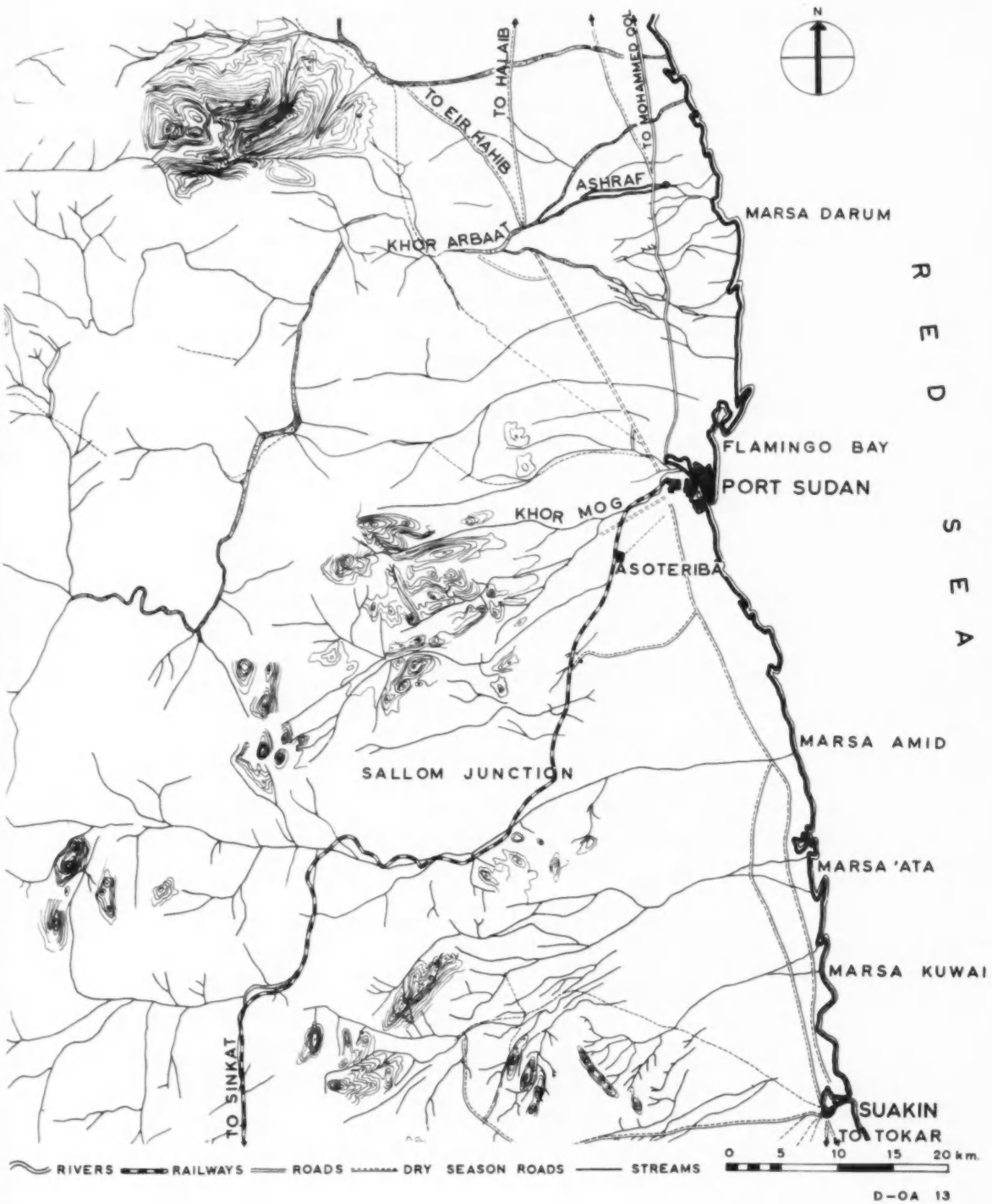
Communications: Roads

92. The present causeway is not adequate to cope with the future traffic. It should be widened in preference on the other side of the railway, in order to take all the traffic to the Northern part of the port without interfering with the railway movements.

93. On the other hand, another causeway should be constructed preferably on the extension of the main axis of development in order to carry the traffic to destinations other than the port.

94. An attempt should be made to avoid crossing between arterial roads and railway lines.

THE SURROUNDING REGION OF PORT SUDAN



D-OA 13

95. The following principles should govern roads in the Master Plan of Port Sudan:

a. The most suitable pattern for the major roads is the gridiron. It is adjusted to the topography of the town and the existing town plan and may prove to be the more adequate to cope with the future traffic volume.

b. Road widths should be classified according to the volume of traffic to be served.

c. Certain roads have to be planned as pedestrian only, where circulation of vehicles is not necessary. This is imperative for reasons both of economy and safety.

d. Suitable layout of plots and access roads, e.g., narrow plot frontage on the roads, so that the length of the roads can be kept to a minimum.

e. If an increase of traffic is anticipated in the future relative space should be provided, but not paved, from now. The excess width could be used initially for sidewalks as grass verges, or even given temporarily to the wayside residents who would be obliged to maintain them.

Population: Growth

96. It is assumed that migration will continue to add to the normal rate of increase. The population of the town in 1956 was 47,562. In accordance with the said rate of increase it is anticipated that the population of the town will be doubled in eighteen years, while the corresponding figure of the population in twenty-five years will be about 126,600.

97. This prediction, however, may be treated as approximate only because as already said many and various factors will influence the growth of the town. It can only be safely said that the population of Port Sudan will reach this figure of 125,000 people within a period of twenty to thirty years.

98. The long-term Master Program should take into account all these considerations regarding the increase of population. To have this Program safely based, planning should be done for 125,000 people and in a flexible way so as to allow for possible revisions and expansions.

99. For planning purposes, an average annual rate of natural increase for the next twenty-five years is reckoned at 2.2%. This is equal to the present rate.

100. Judging from the experience gained in other countries, where the growth of towns has been accurately recorded (as well as information collected from Port Sudan authorities) it is assumed that influx of the rural population will cause Port Sudan to grow at a total average rate of 4.0%.

Population: Sex Ratio

101. For planning purposes it is assumed that in the future a number of females will be added to the population, tending to equal the number of males. But as more male population will continue moving into the town it will be a long time before the male and female population will be equal.

Population: Literacy

102. There are indications that the number of children attending school is increasing steadily. Therefore, the number of schools for the future population must be reckoned on the basis that all boys and girls will attend elementary school.

Public Health: Water Supply

103. The present program of improving and supplementing the capacity of the water-works and the distribution systems consists:

a. In establishing new wells in Khor Arbaat when this becomes necessary.

b. In laying a new water supply main, 12 in. diameter from Khor Arbaat to Port Sudan.

c. In supplementing and extending the distribution pipe system in the town.

Public Health: Sewerage

104. The existing program of the competent authorities for improvement of sanitary conditions involves mainly the gradual eradication of the bucket system. The long-term target, however, will be to replace all existing sanitary systems by an adequate main sewerage system covering the whole area of the town.

Public Works: Electricity

105. To cope with such a big demand a new Power Station is planned in the South town before the end of 1960. It is designed for an ultimate capacity of 4 x 1230 = 4920 KW, but only two sets of half this capacity will be initially installed. The rest will be installed according to demand requirements.

Residential Areas

106. The problem of relation of residences to work places exists in Port Sudan mainly on account of the division of the town to two parts on both banks of the harbour. It is necessary that the problem of workers' housing schemes should be properly and rationally located.

Housing: House Types

107. The choice of the type of residential units constitute a serious problem. The introduction of flats could be an answer to the urgent housing needs, but it does not look likely that flats will be popular, in particular with the low income people.

Housing: Building Intensity

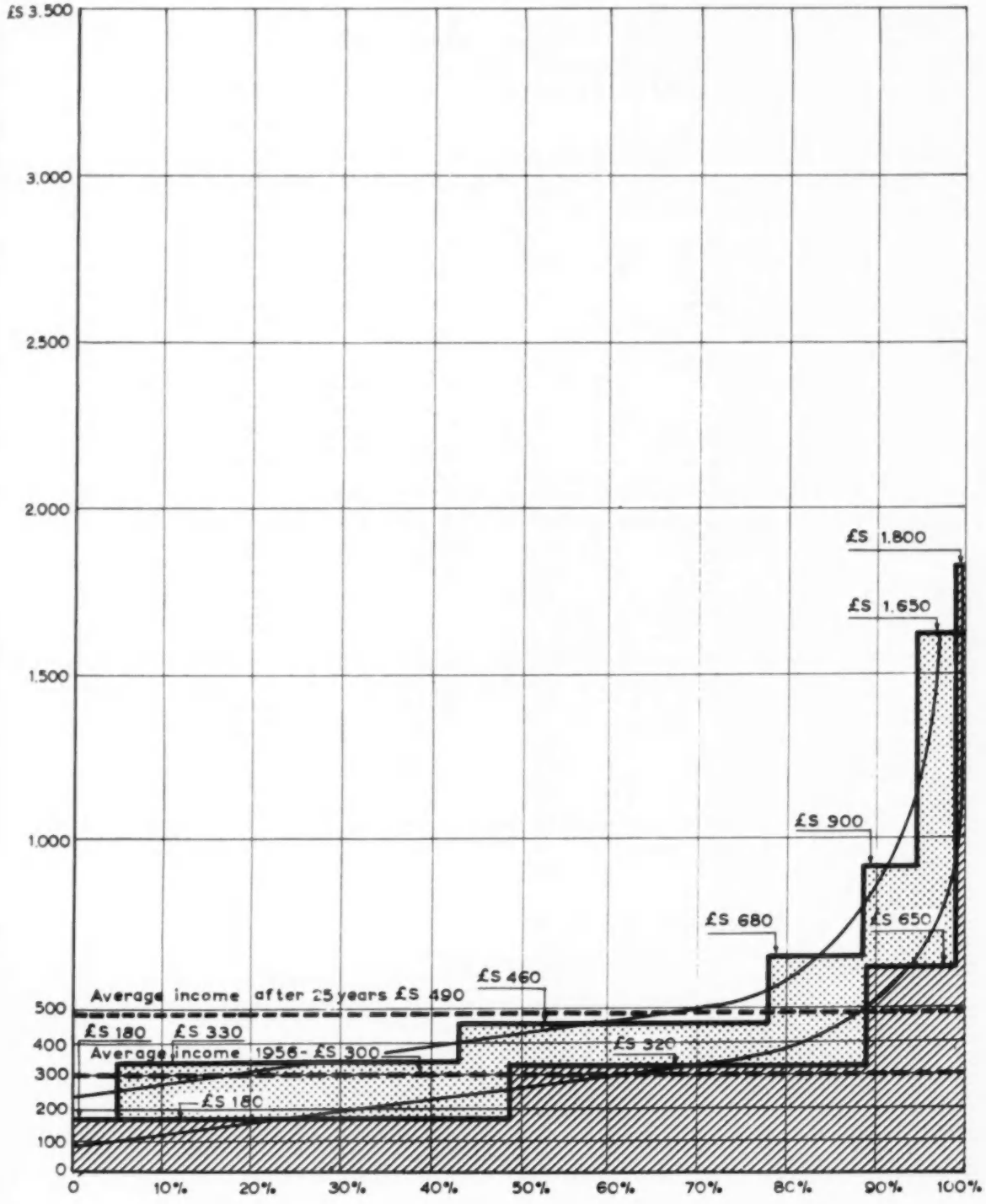
108. The congested housing areas are mainly Deim El Arab with 813 houses, Deim Warsha with 353 houses and Deim El Tigani with 352 houses. To these areas should be added Deim Gabir and Deim Fellata with 495 and 516 houses respectively for their very poor housing conditions. Consequently about 2,500 houses should be replaced. The population living in these houses amounts to about 15,300 people. Should the rate of two persons per room be considered desirable there is an urgent need for 7,650 rooms or about 2,750 houses. To this number another 500 houses of poor conditions in other deims must be added, making a total of 3,250 houses.

109. In addition to this a large number of houses need amelioration. It is roughly estimated that these houses amount to about 1,000.

Community Facilities: Public Open Space

110. The town faces the serious problem of having to provide sufficient number of gardens and parks for the passive recreation of its inhabitants. The problem becomes more difficult because of the lack of suitable soil and sufficient water.

PRESENT AND ESTIMATED FUTURE DISTRIBUTION OF FAMILIES IN ACCORDANCE WITH THEIR ANNUAL INCOME



111. Some places on the banks of the harbour should be used as a look-out point for the people who live in the inner areas.

112. It is believed that a green belt at the Northern fringes of the town should reduce the unpleasant effect created by the sand brought by the North wind. An effort made in the area North of the Steradores houses failed due to the salty soil.

113. From the used areas, agricultural land should be preserved, while the area occupied by the airport may be used for development when the latter is removed to Asoteriba. The salt concession area is under a leasehold expiring in 2017.

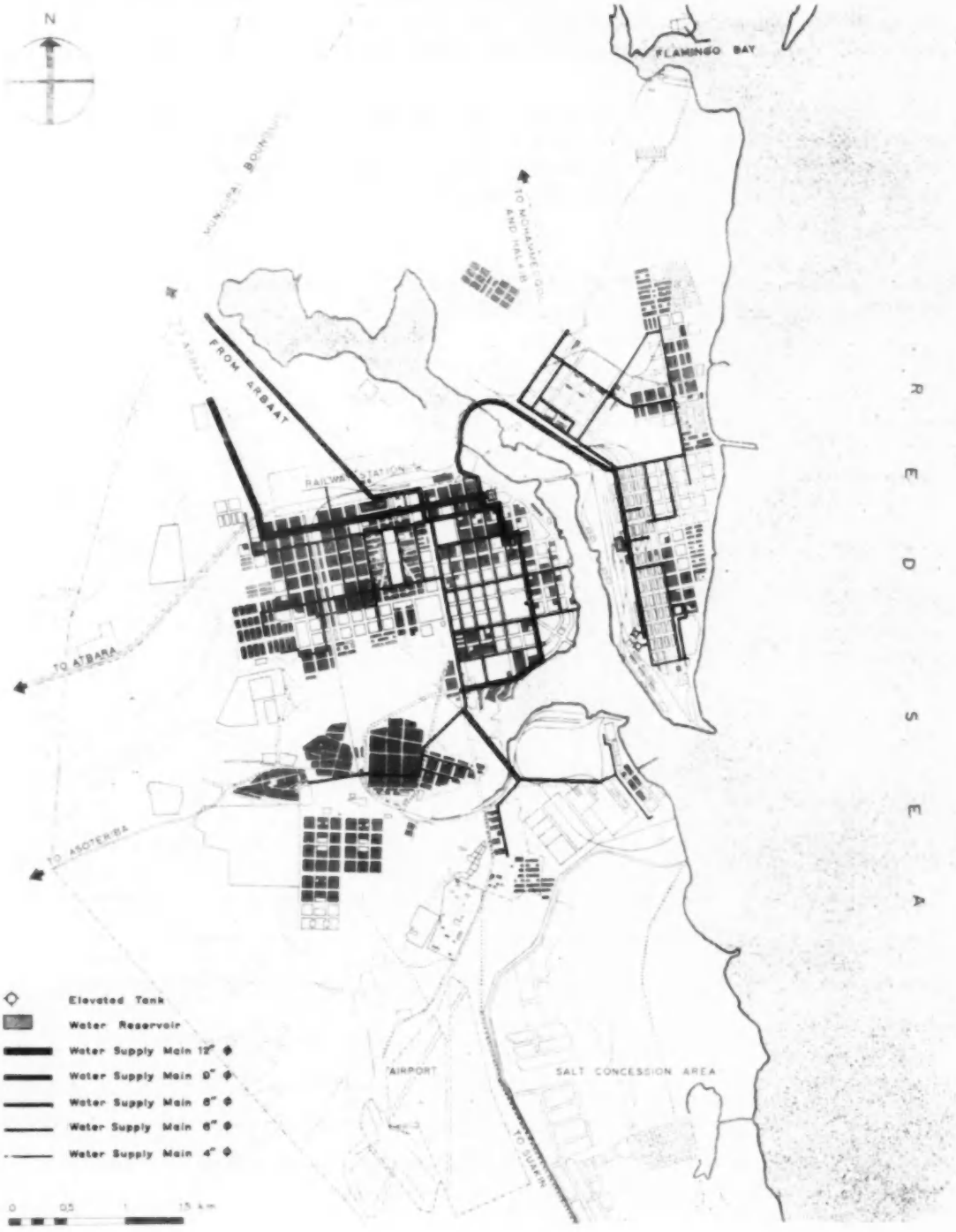
Summary

114.

TABLE XXV

Average annual family income in £S	Percentage of residential units	Number of residential units	Average plot area in sq. m	Total net plot area in hectares
180	5	1115	120	13.3
330	38	8474	155	131.3
460	35	7805	200	156.1
680	11	2453	360	88.3
900	6	1338	560	74.9
1650	5	1115	720	80.3
490	100	22300	244	544.2

WATER SUPPLY NETWORK



The total net plot area needed, therefore, amounts to about 540 hectares. To this an equal area should be added for roads, squares, parks, shopping centers and the needs of community buildings within each neighbourhood. The total gross residential area of the future town will thus amount to about 1080 hectares.

115. It is assumed that for the central civic, commercial and business area, for major parks and cemeteries, for industrial zones and for the major communication terminals' installations excluding the port area another 100 hectares are to be needed. A further 400 hectares must be added to this figure for port installations, warehouses, etc.

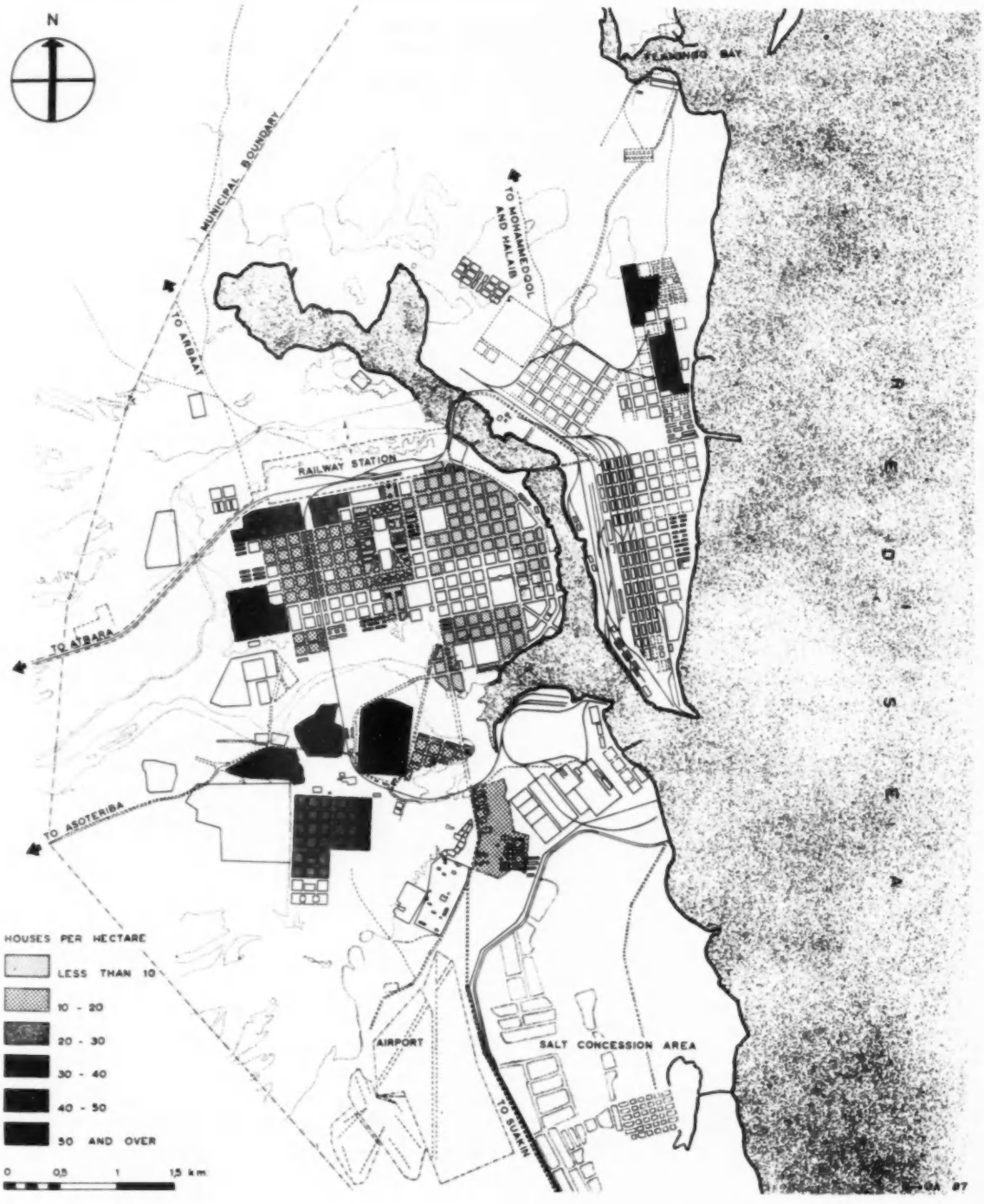
116. On the basis of these assumptions the total area needed for the future town of 125,000 people will be 2480 hectares, allocated as follows:

TABLE XXVI*

Zones	Area in hectares	Percentage to the total area
Residential	1080	50.7
Industrial	300	14.1
Commercial, civic, administrative, etc.	500	23.5
Major open spaces	150	7.0
Railway	100	4.7
Total	2130	100.0
Port installation	400	
Salt concession	600	

*For comparison purposes special uses, such as the port and the salt concession areas, were excluded from the calculation of percentages.

NUMBER OF HOUSES PER HECTARE



117. In addition to these programs the following are the major ones to be studied:

a. Program for an overall sewerage system.

b. Program for securing the future water supply.

c. Program for the development of the port area, with its installations and warehouses.

d. Program for the development of the central area and for the erection of higher order community buildings.

e. Development programs for the creation of industrial estates for the attraction and functional grouping of industries. These estates should be established on both banks of the harbour.

f. Program for the creation of stevedore labour and industrial housing schemes.

Financial Consideration

118. For the realization of the Master Plan all available resources should be mobilized. Projects of national importance should be financed by the Government. Such are the highways, the new aerodrome in Asoteriba, the development of the port, general projects for industrial development, railway installations, higher order schools and other community buildings, etc.

119. Projects of local importance should be financed by local administration, while houses, shops, etc., should be constructed by private initiative. To facilitate action, the Government may to a certain extent finance these projects and charge their cost to the individuals with financial facilities. Municipal works may also be subsidized by the Government at the initial stage of the program.

THE PROGRAMS

The Master Plan

120. In accordance with the policies set out and pursuant to the thoughts on physical development as expressed above, the preliminary Master Plan has been drafted in an effort to solve the major existing problems as well as those which are anticipated to

appear in the future. This Plan aims at serving an eventual population of 125,000 and has the flexibility required for its further expansion if so necessitated.

121. The plan covers the whole area of the present town and provides for completely new residential communities and two industrial zones. The present situation has been respected with a realistic approach. Widening of roads shown is indicative only. The final plans are to be drawn in due time following a thorough study of the local conditions.

122. The total area of the plan is approximately 2200 hectares, allocated as follows:

TABLE XXVII

Zones	North-East to the harbour	South-West to the harbour	Total
Residential	321	538	859
Central, civic, business, etc.	82	316	398
Industrial	220	70	290
Major open spaces	76	56	132
Port	312	193	505
	1011	1123	2184

123. The Plan is based on the following basic ideas:

a. Control of the floods and creation of a main arterial road leading from the new airport in Asoteriba along the Khor Mog canal. The railway line serving the South Port is placed on the other side of the canal.

b. The main axis of the town passes through the inner harbour vertically to this canal.

c. The existing causeway is widened by the construction of a new one on the N-W side of the railway line.

d. A ring road is provided to carry all the passing through traffic, as well as the traffic from the urban centers of the South to the East Port and the industrial area.

e. Agricultural land is respected as far as possible.

f. Extension of the docks is provided along the East side of the harbour as well as in the South Port. It is anticipated that eventually the West side of the harbour is to be used for shipping facilities, but this is a remote possibility.

g. The salt concession area is at the time being respected by the Plan, but this is a matter to be studied further. The plan may be expanded in this direction also, should it be found possible.

h. A heavy industrial zone is provided North of the port. This area is adjacent to the port and well served by the railway.

i. Light industries are kept at the same place, as now, but provision is made for expansion.

j. The central area is kept as it is, but the possibility of a moving center has been ensured.

k. An extensive utilization of the inner harbour is made by the creation of an open space zone, where special buildings are to be allowed to be built, such as high educational buildings, sports centers, clubs, etc.

l. A balance was kept between the areas of the East and West sides of the harbour.

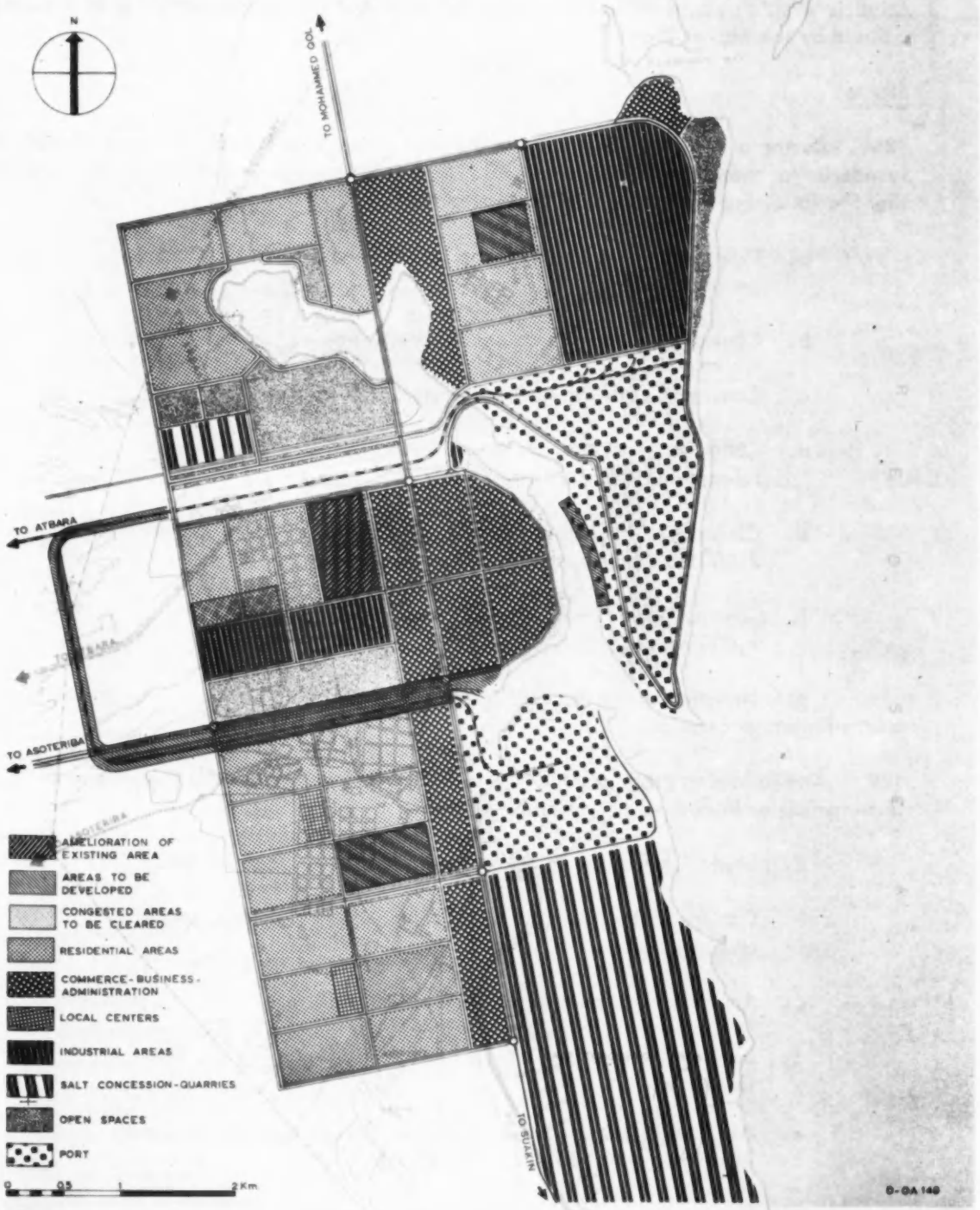
124. The residential quarters are of such a size as to allow for the creation of integrated communities class IV, having the necessary shopping centers, education buildings, religious buildings, sports grounds, etc.

125. All new developments are designed on a rectangular pattern. Any further expansions of the town beyond those provided by the Master Plan may, therefore, be easily added. Such additions will be needed in the future, during a second big phase of Port Sudan's development. They might also be required earlier should any unforeseen factors demand more land for expansion than that provided by the Master Plan.

126. Finally, it is to be stated here that details of the Master Plan, as well as regulations governing use of land in each particular zone and the region surrounding the planning area, are to be dealt with in the Ordinance which will be submitted with the final report.

THE PRELIMINARY MASTER PLAN

FIRST STAGE PROGRAM



127. One of the major problems which will have to be faced is to provide for suitable conditions which would attract the nomads to come and live permanently inside the area defined by the Master Plan.

Stages

128. During a first five-year program the most urgent needs should be covered and the foundation of the long-term program laid. During the first period of action it is suggested that the following projects should be carried out.

a. Extension of the docks on the East Port at a rate of 150 meters per year.

b. Control of the floods caused by the Khors.

c. Construction of the new aerodrome.

d. Construction of the new arterial road to the aerodrome and relocation of the railway line.

e. Clearance of the most congested deims and construction of 2,000 new houses by Government initiative.

f. Construction of residential units by private initiative, 2,000 houses.

g. Improvement of the central area by drawing up a program for the betterment of urban economics.

129. The following programs should also be started, and not completed, through Government or Municipal or combined initiative.

a. Study for and construction of an overall sewerage system.

b. Construction of community buildings of higher order, properly and rationally distributed.

c. Amelioration schemes by the Government.

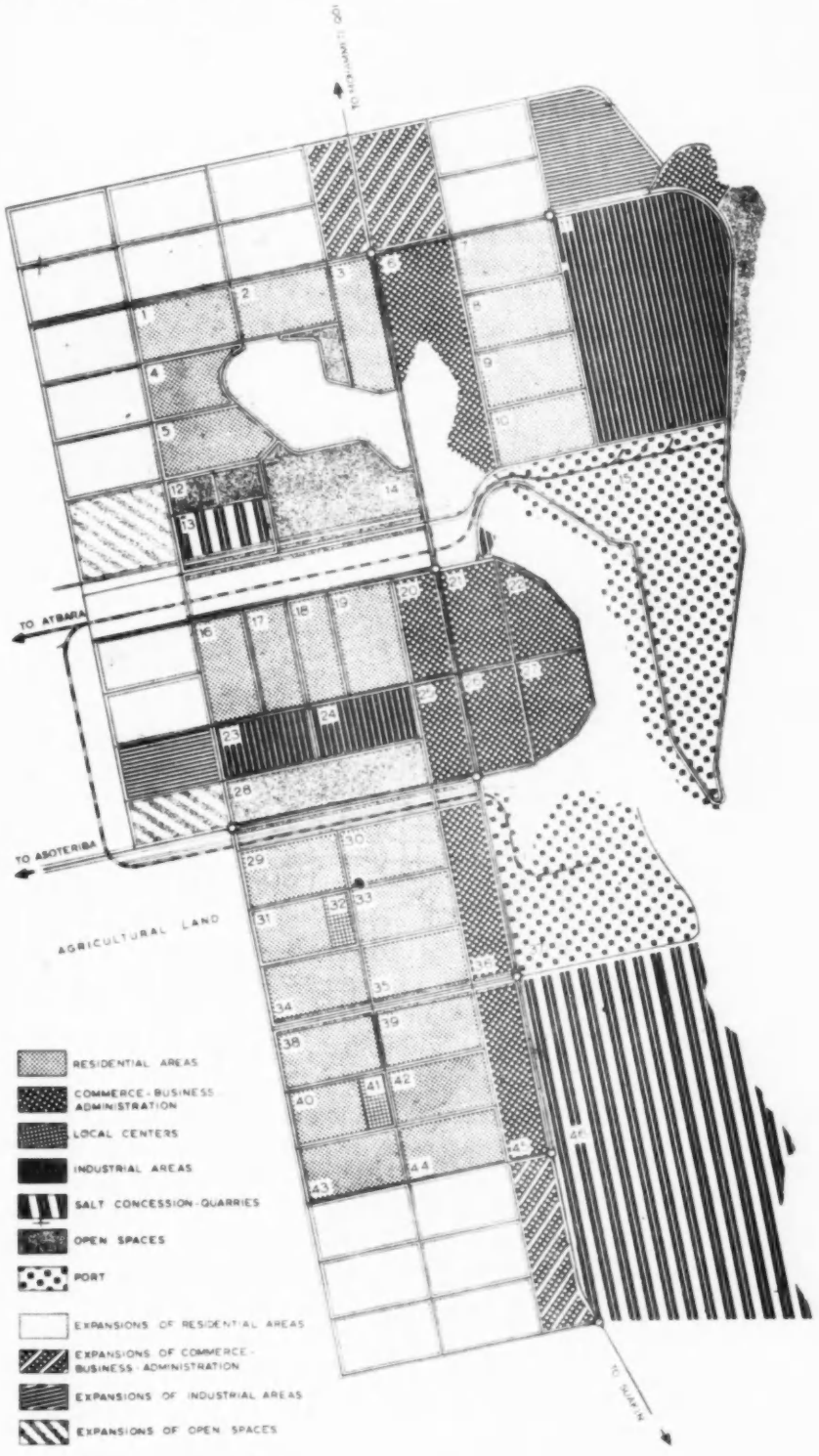
d. Industrial development by private initiative guided by the Government.

e. Program for the attraction of the nomads to settle permanently inside the area defined by the Master Plan.

f. Program for securing the future water supply.

THE PRELIMINARY MASTER PLAN

POSSIBILITIES FOR FURTHER EXPANSIONS



130. The five-year program is to be re-examined and revised annually depending upon new conditions as they appear. It is after such a procedure that the next five years stages could be determined safely. The plan on the opposite page shows the areas where the first stage program should start.

Cost

131. The cost of development of Port Sudan was estimated as follows according to the data collected from the competent authorities:

a.	New communities, including facilities	£S	21.5 million
b.	Community buildings for same	"	3.2 "
c.	Amelioration of 1000 units	"	0.3 "
d.	Roads and community facilities	"	8.9 "
e.	Central area	"	10.0 "
f.	Relocation of railroad lines and Khor Mog	"	0.1 "
g.	Construction of a new aerodrome	"	0.5 "
h.	Extension and amelioration of quays and port facilities	"	7.7 "
i.	Value of land, residential	"	2.8 "
j.	Value of land, commercial	"	11.0 "
	Total	£S	66.0 million

Financing

132. In 1955-56 the total gross fixed investment in the Sudan amounted to £S 14,222,000, of which 5,311,000 were Government investments and £S 8,911,000 private.

133. Of the above investments £S 3,450,000 represented Government contribution to housing investment and £S 6,755,000 was the amount of private investment on housing.

134. No data concerning the exact Government investment for Port Sudan were collected. In any case it can be assumed that about £S 4,5 million were spent in the urban centers of the Sudan. Bearing in mind the population figures of the urban centers and the fact that Port Sudan, as the only port of the country, absorbs a considerable amount, it is assumed that about £S 0.5 million are invested annually in Port Sudan.

135. On the other hand it is known that about £S 30-40,000 are invested by the Municipality, while the average amount spent by private enterprise for building purposes amounts to about £S 0.5 million. Thus, the total amount invested annually is approximately £S 1.1 million. This figure is in good proportion to the total investment figure for the whole country.

136. These annually invested amounts will increase in the future. The increase will be relative to the increase of the national income. It is natural to expect that with higher incomes, greater investments will take place. On the other hand the higher a family income is, the bigger its percentage is going to be for investment.

137. The £S 66.0 million stated as being the total cost for the realization of the Master Plan may be broken down as follows (figures in £S million).

Item	Government investment	Private investment
a. New communities	5.0	16.5
b. Community buildings	3.2	-
c. Amelioration of 1000 units	0.1	0.2
d. Roads, water supply, sewerage, telephones, electricity	8.9	-
e. Central area	5.0	5.0
f. Relocation of railroad, etc., extension of port	7.8	-
g. Construction of new aerodrome	0.5	-
h. Value of land, residential	0.5	2.3
i. Value of land, commercial	4.0	7.0
Total	35.0	31.0

138. It is obvious from the above breakdown that the realization of the Master Plan is well within the realm of Government possibilities and can be affected within the time proposed.

139. On the contrary the expected contribution of private investment is relatively high, as compared to the amounts which are allocated from this source at present. Even if this contribution increases in future, it is rather difficult to carry the burden imposed by the above expectation.

140. In order to encourage and help private initiative, the Government should take the proper measures with regard to:

a. Urban land policy.

b. The national housing program.

141. The leasehold urban land policy, in force up to now, is good in principle and should be continued in future. Urban land should, however, be leased at a faster rate according to demand. Furthermore, the Government could provide special terms of payment for the lower income groups.

142. On the other hand it would be preferable to give to the lowest income groups a longer lease than the one year given now, even if such a measure would mean a payment on the part of the plot holder. This should encourage the private people to make a greater effort towards building more permanent houses.

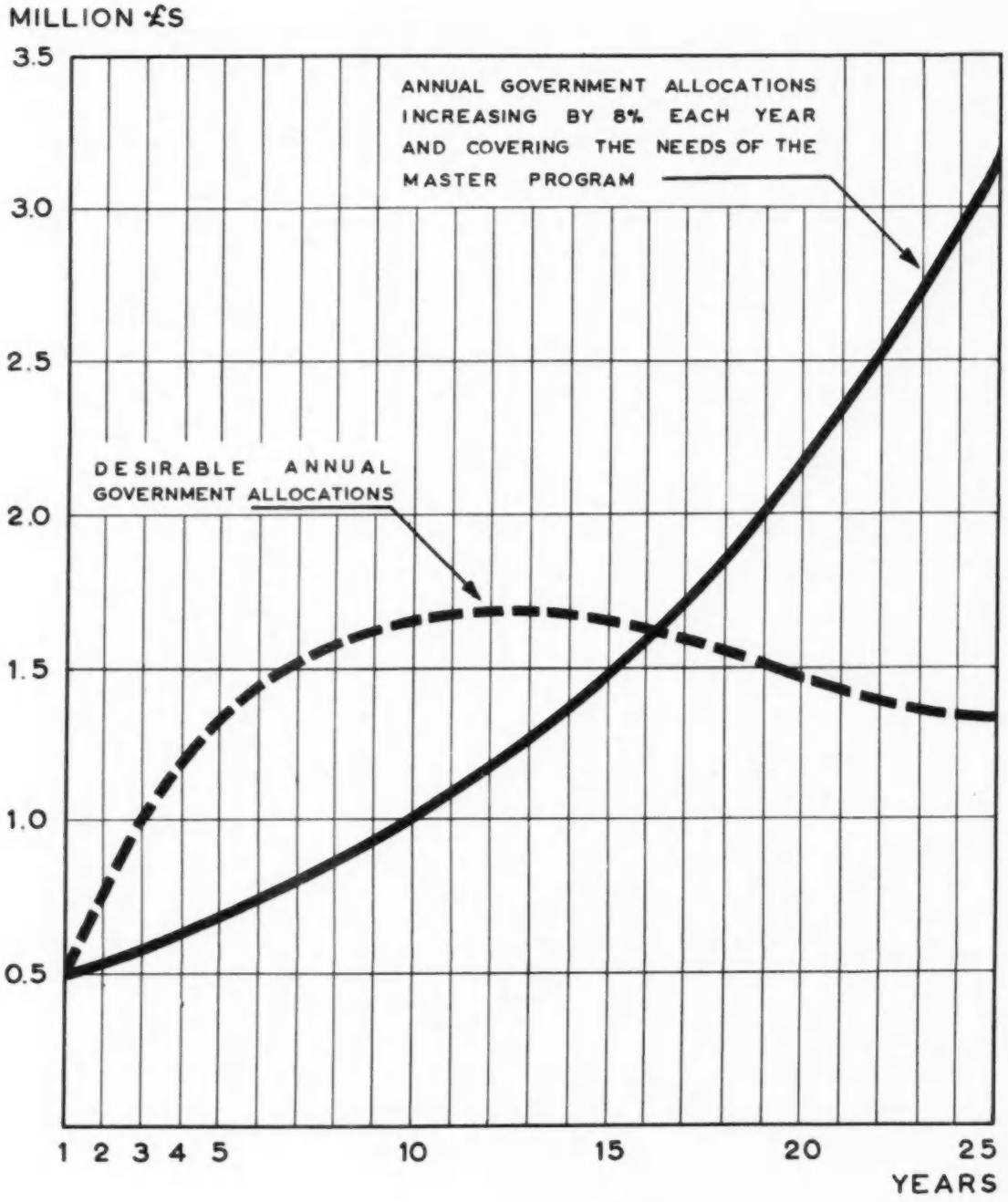
143. Furthermore, a national housing program should be drawn up in order to help the poorest classes towards building their own houses. At present, in Port Sudan, only 36% of the houses are owned by their occupants. This is a very low figure which will lead to social instability.

144. In view of the importance of Port Sudan for the development of the country as the only import and export transport terminal, the Government should give generous help for the implementation of its Master Plan.

145. On the basis of the above ideas the graph of the opposite page has been drawn. One curve shows the annual Government allocations for a period of twenty-five years, calculated on the assumption of a first year allocation of £S 0.5 million, which will be increased by 8% each year, and the other shows the desirable Government allocations. This second curve provides for a bigger effort at the beginning and ensures the realization of the first stage of the program within a reasonable period of time.

146. Apart from these two curves shown on the graph many others may be drawn between them. Each curve would represent a further possibility of annual allocations needed for the accumulation of the total sum which should be provided by the Government within twenty-five years for the development of Port Sudan.

GOVERNMENT ANNUAL ALLOCATION



147. The curve which will represent the actual allocations should be decided upon by the Government according to its general policies.

Cost of the First Stage

148. The cost of the urgent projects which should be carried out by the Government during the first five years of the program's implementation and which have been stated in sector 3 of the present chapter paras 399 and 400, is estimated to amount to £S 5.5 million as follows:

	Government Investment
a. Extension of docks	£S 1.5 million
b. Flood control	" 0.1 "
c. New aerodrome	" 0.5 "
d. Road to aerodrome, new roads and relocation of railway	" 0.5 "
e. Clearance of congested deims and construction of new communities	" 2.0 "
f. Amelioration	" 0.1 "
g. Community buildings	" 0.8 "
Total	£S 5.5 million

149. This sum exceeds the amount allocated to the five-year program out of the total program sum. It should be borne in mind, however, that the big effort for the realization of any long-term program must be made during the first years of that program. Urgent needs will be met at a faster rate, and the continuation and success of the program ensured, if at the beginning of the program the amounts allotted by the Government will be as high as possible. (See para. 418).

THE PUBLICATION of EKISTICS was started in the Autumn of 1955.

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